Volume 94 Number 6

STEEL

For forty-eight Years—IRON TRADE REVIEW

PRODUCTION • PROCESSING • DISTRIBUTION • USE

The Week in Perspective

"WILD BILL" BORAH at the helm, the senate Friday passed a resolution calling upon the federal trade commission for an "investigation" of the operation of the steel code. Jealous of its famous **Pittsburgh-plus** decision in 1924, the commission already has indicated its opposition to multiple basing points for steel prices, of which there are only 57. p. 17

Nearly 75,000 tons of steel will go into hulls of prospective **new ships** for the navy. p. 18

Steel production is strong, in some districts activity approaching the feverish state. **Operating rate** for the past week was **36** per cent, up 3 points. p. 12

Apparently admitting the national labor board's lack of authority in settling disputes, the President by executive order has given the board a new set of teeth. p. 13

BALANCE sheet losses in 1933 for five leading steel interests—67 per cent of the country's capacity—were about half the 1932 deficits. Operations for the fourth quarter resulted in losses 2½ times as heavy as in the third quarter. p. 12

Healthy rivalry between various industrial materials insures their continual refinement, provides users greater selectivity. p. 22

The "new deal" dollar may be an angel of mercy for steel; economists say **foreign trade** will be stimulated, private capital investment encouraged. p. 18

Side skulls in open-hearth **ladles** can be avoided by using insulation in the lining. p. 45

Probably a major topic for discussion at the coming conference of code authorities in Washington will be **open-price** provisions, at which increasingly bitter attacks are aimed. p. 18

An error of 60 points in carbon content of a certain heat of supposedly high-carbon **spring stock** recently gave an automobile bumper manufacturer some anxious moments. p. 46

Some full-finished sheets stocked horizontally at Detroit motor plants are reported to have undergone an increase in hardness of 6 to 8 points Rockwell.

FOREIGN countries need American steel. Proof: Iron and steel **exports** in 1933 rose 126 per cent over the 1932 total to 1,350,692 gross tons. p. 16

Speed nut is the name applied to a **new fastener,** stamped from strip spring steel, greatly facilitating bolted assemblies. p. 28

This week's class in the **plastic forming** of metals develops equations for calculating force required for extrusion of material. p. 36

California is protecting its school children against future earthquakes by condemning old school buildings and insisting upon quakeproof structures reinforced with steel. p. 67

NEW casting alloys, new types of casting machines and a new die steel have joined hands to unlock the door to new opportunities for **die castings.** p. 25

The modern home must be fire-safe and have a nonshrinkable frame. The **steel-frame residence** is known to meet these requirements admirably. p. 32

Ten dollars of the purchase price of the average automobile is charged to the cost of **body dies.** Some individual dies cost as much as $150,000. p. 19

Flat-rolled metals in sheet, strip or continuous coil form are being supplied with **chromium finishes.** p. 34

1933 Steel Losses Half 1932; Better Year for Steel Corp.

ON THE basis of financial reports from five leading integrated producers of steel, representing 44,739,000 tons of ingot capacity, or 67 per cent of the country's total, two deductions may be drawn:

Fourth quarter losses of the industry, after all charges, were about 2½ times those of the third quarter, due chiefly to the incidence of NRA and smaller demand; the industry's loss for 1933 was about one-half the deficit of 1932.

Actually, the combined showing of the United States Steel Corp., Bethlehem Steel Corp., Jones & Laughlin Steel Corp., National Steel Corp., and Inland Steel Co. was a deficit of $7,170,289 in the fourth quarter, contrasted with a loss of $2,763,849 in the third quarter. For all 1933 these companies lost $47,642,621, compared with $99,873,289 in 1932.

¶United States Steel Corp. had an operating profit of $5,537,084 in the fourth quarter, a less favorable showing that the profit of $11,816,832 in the third quarter, but considerable improvement over the deficit of $3,828,272 in the fourth quarter of 1932. The Steel corporation, like all producers, suffered from a smaller market and increased expenses due to NRA in the fourth quarter.

After all charges, but prior to the partial preferred dividend, the Steel corporation deficit in the fourth quarter was $7,945,445. In the third quarter the deficit was $2,717,014, and in the fourth quarter of 1932 it was as high as $16,729,368.

For the year the net deficit in income account after all charges, but before dividends was $36,519,000, compared with $71,176,000 in 1932.

Fourth quarter operations, based on production of finished products for sale, were 23 per cent below the third quarter. For all 1933, finishing capacity was operated at 29 per cent, against 18 in 1932, the 1933 production being 5,543,000 tons, compared with 3,591,000 tons in 1932.

Net working assets of the Steel corporation on Dec. 31 at $363,885,159 were fractionally higher than the $363,395,459 the year preceding.

Details for the Steel corporation for the fourth quarter follow:

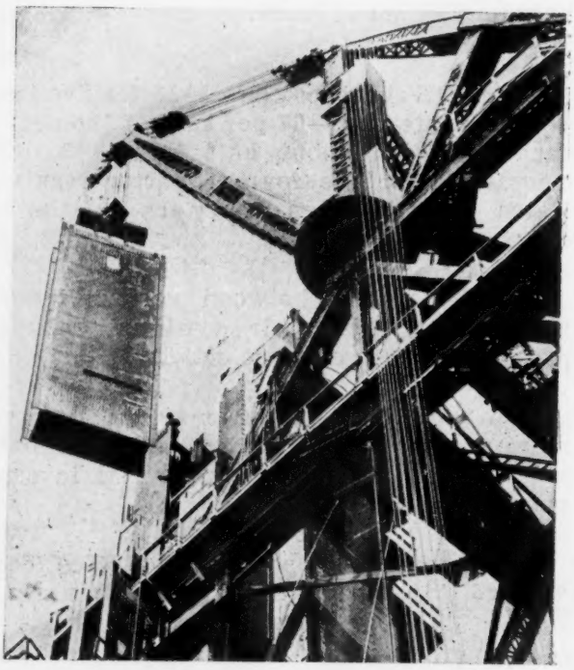
Earnings for the quarter resulting from operations after deducting all expenses incident thereto, including ordinary repairs and maintenance of plants and taxes		$ 5,537,084
Charges and allowances for depletion, depreciation and obsolescence		10,820,174
Deficit		$ 5,283,090
Interest charges for the quarter:		
On bonds of subsidiary companies	$ 1,268,802	
On United States Steel Corp. bonds outstanding	3,363	
		1,272,165
Total deficit from operations		$ 6,555,255
Add, proportion of overhead expenses (of which taxes alone are $1,724,922) of the Lake Superior iron ore properties and Great Lakes transportation service, normally included in the value of the season's production of ore carried in Inventories, but which because of curtailment in tonnage of ore mined and shipped in 1933 is not so applied		2,017,420
		$ 8,572,675
Special income: Proportion of interest on railroad recapture payments refunded, less reserve for account of adjustments in connection with employes' stock subscription plan, including net balance of sundry receipts and charges account adjustment of various accounts		627,230
		$ 7,945,445
Dividend for the quarter on stock of United States Steel Corp.: Preferred, ½%		1,801,405
Total deficit for the quarter		$ 9,746,850
Deficit for the nine months ending Sept. 30, 1933, as reported quarterly	$33,478,867	
Federal capital stock tax for the six months ending June 30, 1933	499,184	
		33,978,051
Total deficit for the year provided from undivided surplus		$43,724,901

¶Inland Steel Co., Chicago, shows net income, after all charges, of $529,373 in the fourth quarter, a slight reduction from the net of $623,612 in the third quarter. For the year, Inland's net was $166,693, compared with a deficit of $3,045,628 in 1932.

¶Continental Steel Corp., Kokomo, Ind., reports net profit of $23,889, after all charges, for the last half of 1933, equal to 86 cents a share, on the 7 per cent cumulative preferred. In the last half of 1932 there was a loss of $296,159.

¶National Steel Corp., Pittsburgh, reports for 1933, a net profit of $2,812,406 after federal taxes, depreciation, depletion and interest, equivalent to $1.30 a share on 2,156,832 common shares. This compares with $1,662,919, or 77 cents a share in 1932.

For the fourth quarter net profit was $242,530 after taxes and charges



GOING UP: Fabricated steel sections weighing 48 tons are lifted easily into place during construction of the gigantic suspension bridge across the Golden Gate at San Francisco. Acme Photo

equal to 11 cents per share, comparing with $354,045 or 16 cents per share in the December quarter of 1932. Consolidated income account for 1933 compares as follows:

	Fourth Quarter, 1933	Year, 1933
Profit from operations and income from interest and dividends after deducting costs of sales, general expenses, but before depreciation, interest and federal income tax	1,590,801.48	8,392,209.44
Provision for depreciation and depletion	839,868.66	3,091,680.73
Profit before interest and federal income tax	750,932.82	5,300,529.07
Interest charges	495,012.52	2,005,459.19
Profit before federal income tax	255,920.30	3,295,069.88
Provison for federal income tax	13,390.01	482,663.21
Net profit	242,530.29	2,812,406.67

In April, 1933, the shares were changed from no-par status to $25 par value and at the close of the second quarter the stock was restored to an annual dividend basis of $1 per share, having been reduced in September, 1932, to 50 cents basis. The regular dividend of 25 cents per share was declared on Jan. 10, 1934.

¶Atlantic Steel Co., Atlanta, Ga., reports net income of $54,273 in 1933, after all charges, contrasted with a loss of $156,187 in 1932.

¶United States Steel Corp. is expected shortly to make its annual offer of common stock to employes. Last year stock was priced at $27, lowest on record. Judging from the present market, the price will be about twice as much.

Labor

PRESIDENT ROOSEVELT'S action Friday in cloaking the national labor board with greatly increased authority to determine whether employes of corporations desire elections to choose representatives for collective bargaining and otherwise greatly increasing its powers, is regarded as a tacit admission that heretofore the board has been lacking in authority.

In the Weirton Steel Co., E. G. Budd Mfg. Co., Philadelphia Rapid Transit System, National Lock Co. and other cases, the labor board was charged with exceeding its powers, and especially in the Weirton case did threatened action by the board not materialize.

The prospect is that representatives of the labor board will poll Weirton employes at their homes or at some point off the company's grounds to determine whether or not employes are satisfied with the outcome of the Dec. 15 election, the source of the present trouble and at which company union employes won a decided victory.

The President's action Friday followed the visit of a delegation of Weirton workers headed by W. J. Long, an organizer for the Amalgamated Association of Iron, Steel and Tin Workers, to Washington. The delegation claimed to represent 75,000 employes, and said serious disaffection among 450,000 steel employes is brewing. A threat to picket the White House if admission was denied them was made, but the group was pacified by General Johnson, NRA administrator.

¶Temporary peace was arranged at the Isabella mine of the Weirton Coal Co., at Republic, Pa., by the national labor board, and work was resumed Jan. 31. The mine management refused to demote its superintendent, D. A. Boyer, but adjusted other grievances, and a withdrawal of the deputy sheriffs and union pickets followed.

¶Manual labor in a steel mill never was considered particularly conducive to longevity, but last week a steel worker died at the age of 108 at Glassport, Pa. He was Frank Jonkolski, who retired involuntarily from a McKeesport, Pa., mill when he was only 96.

Meetings

CARNEGIE STEEL CO.'s annual dinner at Pittsburgh, Jan. 27, brought from New York William A. Irvin, president, and C. L. Wood and Charles S. Belsterling, vice presidents, United States Steel Corp.

Postponed for several weeks, it was expected by some that an announcement concerning plans of the Steel corporation for decentralizing control at New York and grouping Pittsburgh district subsidiaries in one large company might be announced. But nothing developed along this line.

Executives of all Steel corporation subsidiaries in the Pittsburgh district met Jan. 31, with I. Lamont Hughes, Carnegie's president, absent on account of illness. The week previous, along with Carnegie, the American Sheet & Tin Plate Co. and National Tube Co. also held their annual sales meetings.

¶Eugene G. Grace, president, Bethlehem Steel Corp., spoke at the annual dinner of employe representatives of its Lackawana plant at Buffalo, Jan. 29. He declared the company's employe representation plan is the most satisfactory that has yet been devised to assure a square deal for all elements in plant operation and predicted continued expansion of this plan of operating large industries.

WITH CALLIOPE SCREECHING AND FLAGS FLYING, the stern-wheeler I. LAMONT HUGHES, *flagship of the Carnegie Steel Co. fleet, left Pittsburgh recently with its 100th tow of steel products for southern ports. Eleven barges were in the tow, the covered ones containing Carnegie Steel, National Tube and American Sheet & Tin Plate Co.'s products; the open barges, as shown, have fabricated material on deck from American Bridge Co.'s Ambridge, Pa., plant. Far in the stern of the tow can be seen white puffs of steam from the calliope. Rivermen say it is the first time in their knowledge anything but a show boat has had one, to play a tune sailing down the Ohio*

Transportation

YOUNGSTOWN SHEET & TUBE CO., Republic Steel Corp., Sharon Steel Hoop Co., and the Youngstown chamber of commerce filed suit in federal court in Cleveland last week to enjoin the ICC from making effective increases in coal freight rates Feb. 15. The ICC would increase rates on river-rail coal to Youngstown from 77 cents a ton to 90.

¶Class I railroads in 1933 had total transportation operating receipts of $3,126,760,154, of which $2,450,829,130 was from freight. The 1933 volume of freight was 28,194,828 carloads of 24.9

tons each, average receipts per ton-mile being 1.05 cents.

Total railroad expenditures to keep their properties physically going were $2,524,880,628, of which $1,436,842,343 was for salaries and wages, and $539,051,234 was for materials and supplies other than fuel.

Uses of Steel

STEEL houses to provide inherent security against earth shock, cyclone, termites, fire and dry rot are to be built in Los Angeles by Palmer Steel Buildings Inc., a California corporation with headquarters in Los Angeles.

Residences or buildings of any kind may be duplicated in all-steel, allowing complete flexibility in design, and yet no detail of steel construction is apparent.

Cellular steel walls, imbedded in reinforced concrete, are continuous around the entire building, and may be anchored either to a foundation or to a full-floating floor slab under the entire building. Crimp interlocking joints hold the wall sections in alignment, and heavy steel rods are threaded through all the sections and locked with concrete.

The steel roof, of lighter material, may be finished in any design and with any type of architectural roofing such as slate, tile, fireproof shingles or wooden shingles, at the option of the customer. Exteriors may be finished in stucco, brick veneer, or any type of siding desired. Chimneys and other masonry are locked with the wall sections by means of heavy steel rods locked with concrete.

Vincent Palmer, architect, is president; Roy Lacy, of Lacy Mfg. Co., vice-president; Henri Lindsey, Henry B. Day Co., secretary; Robert Orr, A. I. A. architect and technical director; and Walter Guedel, treasurer and general manager.

¶Two weeks ago STEEL (Jan. 22 p. 13) described an order for 1000 55-gallon stainless steel drums Coca Cola Co., Atlanta, Ga., had placed with Stevens Metal Products Co., Niles, O., with 18-8 chrome nickel steel to be supplied by Republic Steel Corp.

Further details now available show Coca Cola also to have placed an order for 500 of the drums with Petroleum Iron Works, Sharon, Pa. For the latter 500 drums, American Sheet & Tin Plate Co., Pittsburgh, is supplying the 18-8 steel.

¶Claimed to be the largest steel truck trailer ever built is a unit 40 feet long, 22 feet 6 inches wide and having a capacity of 218 tons, to be used for hauling sections of steel pipe from the fabrication plant to the canyon for use in the penstock tunnels of the Boulder Dam project.

Operations

STEELMAKING operations snapped back 3 points to 36 per cent last week, and every indication points to a further rise this week.

Youngstown, eastern Pennsylvania, Detroit, Cleveland, Buffalo, and Chicago, all registered gains. Pittsburgh and New England were the only districts to decline. Birmingham and Wheeling mills remained stationary.

Youngstown: Advanced 9 points to 41 per cent last week and starting this week at 42 per cent, the highest in three months. Almost 40 open-hearth furnaces are melting. The bulge is chiefly due to automotive releases.

Pittsburgh: Off 3 points last week to 19 per cent, and barely holding that rate. A leading interest operated at 23 per cent, but others were as low as 16. However, Bethlehem blew in a Cambria stack, making 18 out of 60 steelworks stacks in this district active. Carnegie has 9 of 32 stacks on, Jones & Laughlin 3 of 11, Bethlehem 3 of 7, and American Steel & Wire, National Tube and Pittsburgh Crucible 1 each.

Buffalo: Up 2 points to 32 per cent last week and expected to hold this week. Thirteen open hearths are on. No substantial change is expected until a rolling of rails is scheduled and navigation on the Great Lakes opens.

Chicago — Increased more than 1 point to slightly over 31 per cent, with a similar or larger gain likely this week. Illinois Steel Co. added a blast furnace at South Chicago, giving the district 9 stacks in out of 36.

Cleveland-Lorain—Up 5 points to 69 per cent, Corrigan, McKinney Steel Co. operating 12 open hearths, Otis Steel Co. 7, and National Tube Co., Lorain, 8. Corrigan, McKinney company also lighted another blast furnace, operating all four units. Newton Steel Co.'s Newton Falls, O., mills to resume Feb. 19, an affiliate of Corrigan, McKinney company.

Wheeling: Unchanged at 64 per cent, with 25 out of 39 open hearths active. The same rate is scheduled for this week.

Detroit: Enough open hearths have been lighted in this district to make over 900,000 tons of the district's total capacity of 1,200,000 tons. This lifts the rate from 46 per cent to 79.

New England: Off 4 points to 82 per cent, with a further slight decline indicated this week.

Central eastern seaboard: Advanced 2 points to 25½ per cent last week, with further improvement probable this week, due to rail releases.

Birmingham: Unchanged at 52 per cent, with the future to be determined by pending rail business.

¶A race between Otis Steel Co. and Wheeling Steel Corp. to see which can turn out the most sheets on a continuous mill has undergone clarification. Recently Otis Steel Co. claimed a record for 1800 tons in 24 hours, only to have Wheeling roll 2200 tons in 24 hours.

Now Otis has rolled 1784 tons in 17½ hours, or more than 100 tons per hour. The Wheeling record at its Steubenville mill averaged 91.7 tons per hour. The Otis mill was built by United Engineering & Foundry Co. and the Wheeling mill by the Mesta Machine Co., both of Pittsburgh.

¶Still another record is claimed by B. W. Lanz, superintendent and general manager, Columbia Steel Co., Torrance, Calif. With 1550 men on the payroll the company broke its previous record with a production of 10,517 tons of various products in the four weeks ended Jan. 23.

STEEL HOUSE ADVOCATE: Bennett Chapple, vice president, American Rolling Mill Co., Middletown, O., who for the past 12 years has followed the development of metal residences in this country and abroad, will speak at the thirty-fifth annual convention of the American Ceramic society in Cincinnati, Feb. 11-16. He will discuss application of ceramic products as exteriors for metal buildings

Merger

NEITHER General Motors Corp. nor Corrigan, McKinney Steel Co. would discuss last week negotiations between the two looking to a working agreement, if not a merger, the apparent objective of General Motors being to achieve a closer tie-up with its steel sources and increase its influence on the trend of steel prices. But the deal was generally believed to be dead.

In the bitter chill of a zero cold

wave, railroad crews, electrical repairmen, plumbers, and a corps of other workmen descended last week on the Newton Steel Co. plant at Newton Falls, O., idle since June, 1931. Heavy orders for automotive sheets, congesting the new Newton mill at Monroe, Mich., caused officials to decide to reopen the long-idle Ohio plant.

Several foremen from the Monroe plant have been stationed in Newton Falls, and in the next few weeks 350 men will be hired, some of them recruited from forces previously on the plant payroll.

Washington

SENATE Friday passed a resolution by Senate Borah calling upon the federal trade commission to make an investigation of the steel code and report the results as soon as possible, showing the practice of the steel industry under the code with reference to price fixing and increase in prices and "such other matters as would give a full presentation of the facts touching the industry since it went under the NRA code."

NRA Administrator Johnson said Friday, "It's alright with me."

Institute

AMERICAN IRON AND STEEL INSTITUTE directors, meeting Thursday and Friday of last week, supplementing the usual middle of the month meeting, were confronted with unusually perplexing problems.

At Washington, congress was sniping at the steel code and the senate adopted a resolution requiring the federal trade commission—never a friend of the steel industry—to investigate steel pricing methods.

The Pennsylvania railroad's Feb. 5 closing involved a delicate point. The Pennsylvania having named outside trustees as the owners of materials up for bids, the question was whether producers of steel should quote on the basis of published tariffs or under commercial resolution No. 29. Pending final word, producers generally were preparing to quote on the basis of commercial resolution No. 29.

Although no formal announcement was made on Friday, it was understood that the administrative committee of the institute confirmed the action of the traffic committee and requested the latter committee to have western railroads withdraw their tariffs requiring the earmarking of steel privileged under FIT regulations. This would dispose of the hearing scheduled for Feb. 28 at Chicago.

Jackson, O., producers of silveries

(*Please turn to Page* 18)

12 Stacks Resume in January; Output Gains 2.5 Per Cent

DESPITE the fact that operating blast furnaces at the close of January totaled 12 more than at the end of December, production of coke pig iron in the United States in January registered a gain of only 2.52 per cent. Intermittent operation and slower blowing of numerous stacks were responsible for the lack of better showing.

Average daily output for January was 39,426 gross tons, which compared with the 38,456-ton rate of December, was an increase of 970 tons, or 2.52 per cent. This was the largest daily rate since last October, with 43,824 tons, and the best January since 1931, with 55,337 tons. The January, 1933, daily rate was 18,348 tons and in January, 1932, it was 31,336 tons.

Total production for January was 1,222,214 tons, an increase of 30,078 tons, or 2.52 per cent, over the 1,192,136 tons of December. The January total was the best since October of last year with 1,358,540 tons, and the highest for any January since 1931, when 1,715,443 tons of iron was produced. The January figure for 1933 was 568,785 tons; for 1932 it was 971,437 tons.

Active blast furnaces on Jan. 31 totaled 86, against 74 on Dec. 31, 77 on Nov. 30, 81 on Oct. 31, and 89 on Sept. 30. The operating total for the month just closed was the best for any January since 1931, when 102 furnaces were making iron. Only 45 stacks were blowing at the close of January, 1933, and 61 on January, 1932.

During January, 16 furnaces were blown in and 4 were blown out or banked. Of the nonmerchant or steelworks class, 15 were blown in and 3 were blown out, the net gain being 12. Of the merchant class, 1 stack resumed and 1 went out.

Relating production to capacity, the operating rate for January was 28.6 per cent, against 27.9 per cent in December. This was the highest since last October with 31.8 per cent. In 1933, the January rate was 13.3 per cent, in 1932 it was 22.1 per cent, in 1931 it was 38.4 per cent.

Furnaces resuming in January were: In Ohio: Massillon, Republic Steel Corp.; one Buckeye, American Rolling Mill Co.; Ohio No. 2 and Mingo No. 4, Carnegie Steel Co.; Lo-

AVERAGE DAILY PRODUCTION

	1934	1933	1932	1931
Jan.	39,426	18,348	31,336	55,337
Feb.		19,752	33,122	61,114
Mar.		17,484	31,194	65,448
Apr.		20,786	28,524	66,986
May		28,784	25,282	64,355
June		42,165	20,867	54,599
July		58,108	18,394	47,170
Aug.		59,137	17,035	41,264
Sept		50,264	19,788	38,947
Oct.		43,824	20,795	37,831
Nov.		36,124	20,858	36,727
Dec.		38,456	17,650	31,625
Av.		36,223	23,699	50,035

JANUARY IRON PRODUCTION

	No. in blast last day of month Jan.	Dec.	Total tonnage Merchant	Nonmerchant
Ohio	23	19	64,328	274,016
Penna.	26	19	47,076*	271,172*
Alabama	10	10	53,437	71,446*
Illinois	4	4	15,963	56,696
New York	7	7	53,369	36,516
Colorado	1	1		
Indiana	5	5	274	183,004
Maryland	3	3		
Virginia	0	0		
Kentucky	1	1		
Mass.	0	0		
Tennessee	0	0		
Utah	1	1	3,081	91,836
West Va.	2	1		
Michigan	3	3		
Minnesota	0	0		
Missouri	0	0		
Total	86	74	237,528*	984,686*

*Includes ferro and spiegeleisen.

MONTHLY IRON PRODUCTION

	1934	1933	1932
Jan.	1,222,214	568,785	971,437
Feb.		553,067	960,550
Mar.		542,013	967,015
Apr.		623,606	855,734
May		892,326	783,769
June		1,264,953	626,015
July		1,801,345	570,222
Aug.		1,833,265	528,105
Sept.		1,507,931	593,640
Oct.		1,358,540	644,648
Nov.		1,083,740	625,753
Dec.		1,192,136	547,179
Total		13,221,707	8,674,067

RATE OF OPERATIONS

(Relation of Production to Capacity)

	1934[1]	1933[1]	1932[2]	1931[3]
Jan.	28.6	13.3	22.1	38.4
Feb.		14.3	23.4	42.5
Mar.		12.7	22.0	45.4
Apr.		15.1	20.2	46.5
May		20.9	17.9	44.7
June		30.6	14.7	37.9
July		42.2	13.0	32.7
Aug.		42.8	12.0	28.7
Sept.		36.4	14.0	27.0
Oct.		31.8	14.7	26.3
Nov.		26.2	14.7	25.5
Dec.		27.9	12.5	22.0

[1]Based on capacity of 50,313,975 gross tons, Dec. 31, 1932; [2]on capacity of 51,598,175 tons; [3]on capacity of 52,515,875 tons. Capacities by American Iron and Steel institute.

rain No. 4, National Tube Co. In Pennsylvania: Steelton B and Cambria E, Bethlehem Steel Co.; Edgar Thomson G and I, Duquesne Nos. 3 and 4, Carrie No. 1 and Clairton No. 1, Carnegie Steel Co.; National No. 2, National Tube Co.; one Palmerton, New Jersey Zinc Co. In West Virginia: Weirton No. 2, National Steel Corp.

Stacks blown out or banked were: In Ohio: One Toledo, Interlake Iron Corp. In Pennsylvania: Steelton A and Cambria G, Bethlehem Steel Co.; Aliquippa No. 4, Jones & Laughlin Steel Corp.

1933 Steel Exports Make Heavy Gains; December Total Best Since May, 1930

STEEL and iron exports of the United States in 1933, at 1,350,692 gross tons, exceeded those of 1932 by 756,042 tons, 126 per cent, and of 1931 by 381,700 tons, according to compilations by the iron and steel division, bureau of foreign and domestic commerce.

Increased exports of steel scrap account for most of this gain, the total for this item in 1933 being 781,349 tons, compared with 227,522 tons in 1932, a gain of 553,827 tons. This leaves an increase of 202,215 tons in other steel items, in finished form.

Principal gains in 1933 included tin plate, 55,635 tons, more than 150 per cent of the 1932 total. heavy steel rails, 27,520 tons; galvanized steel sheets, 27,183 tons; seamless casing and oil pipe line, 16,516 tons; barbed wire, 12,205 tons; galvanized wire, 8262 tons.

In December 184,585 gross tons of steel and iron products was exported the largest volume since May, 1930. This exceeded the total for November by 26,985 tons. Scrap shipments rose 15,380 tons over November and other gains were well distributed, three classifications showing larger tonnage for every two which were smaller.

Imports in 1933 were 414,790 gross tons, which is 36,376 tons greater than the total in 1932, approximately 10 per cent. This was the first time since 1928 when a year showed a gain over its predecessor, Raw materials showed the greatest increase, with finished materials, as a rule, losing ground. Scrap, as in exports, showed the greatest gain, 47,265 tons, ferromanganese 36,586 tons, pig iron 28,000 tons, and wir rods 5407 tons.

FOREIGN TRADE OF UNITED STATES IN IRON AND STEEL

Gross Tons

	1933		1932	
	Imports	Exports	Imports	Exports
Jan.	21,892	56,720	31,053	40,660
Feb.	19,748	63,936	26,738	40,492
March	22,114	80,567	41,031	49,927
April	28,061	100,295	35,935	58,086
May	26,295	123,069	39,751	80,477
June	34,368	102,581	34,494	52,081
July	52,805	88,311	18,005	52,558
Aug.	46,839	119,374	23,623	32,955
Sept.	55,706	108,799	29,241	36,038
Oct.	46,673	164,755	33,693	47,226
Nov.	28,979	157,600	34,924	56,021
Dec.	31,310	184,585	29,390	54,137
Total	414,790	1,350,692	378,414	594,650

ORIGIN OF DECEMBER IMPORTS

Gross Tons

	Pig iron	Manganese ore	Ferromanganese
Belgium	125	.....	.....
Netherlands	7,373	.....	.....
Sweden	230	.....	.....
United Kingdom	100	.....	.....
Canada	767	.....	2,338
British India	6,936	.....	.....
Chile	.....	211	.....
Gold Coast	.....	2,395	.....
Poland	.....	.....	80
Norway	.....	.....	1,705
Total	15,531	2,606	4,123

	Sheets skelp and sawplates	Structural shapes	Steel bars	Hoops and bands
Belgium	402	1,855	1,455	992
Germany	316	454	270	215
Sweden	3	.....	276	3
Unit. Kingdom	2	.....	45	.....
France	.....	14	34	55
Canada	.....	.....	1	.....
Austria	.....	.....	10	.....
Czechoslovakia	.....	.....	1	.....
Cuba	.....	.....	.....	2
Total	723	2,323	2,092	1,267

UNITED STATES IMPORTS OF IRON AND STEEL PRODUCTS

Gross Tons

Commodity	Dec. 1933	Nov. 1933	Dec. 1932
Pig Iron	15,531	4,079	14,244
Sponge iron	.....	.....	22
Ferromanganese, spiegeleisen	4,123	9,791	999
Ferrochrome	.....	.....	42
Ferrosilicon	62	310	5
Other ferroalloys	.....	.....	36
Scrap	396	2,935	.....
Steel ingots, blooms, etc.	101	69	86
Concrete bars	116	479	905
Hollow bar, drill steel	102	118	73
Merchant steel bars	2,082	2,026	1,711
Iron slabs	.....	.....	3
Iron bars	60	93	44
Wire rods	1,143	778	1,149
Boiler and other plate	3	43	1
Sheets, skelp, saw plate	723	682	1,262
Tin plate	28	.....	1
Structural shapes	2,323	2,164	4,166
Sheet piling	.....	.....	.....
Rails and fastenings	103	981	245
Cast-iron pipe, fittings	.....	186	.....
Welded pipe	260	150	361
Other pipe	326	278	130
Barbed wire	1,385	389	521
Round iron, steel wire	192	458	105
Telegraph, telephone wire	1	.....	3
Flat wire, strip steel	184	150	91
Wire rope, strand	201	163	146
Other wire	111	125	123
Hoops and bands	1,267	1,682	1,777
Nails, tacks, staples	324	651	1,051
Bolts, nuts, rivets	27	26	26
Horse and mule shoes	7	20	29
Castings, forgings	179	153	33
Total	31,310	28,979	29,390

UNITED STATES EXPORTS OF IRON AND STEEL PRODUCTS

Gross Tons

Commodity	Dec. 1933	Nov. 1933	Dec. 1932
Pig Iron	448	42	
Ferromanganese, spiegeleisen	5	6	b
Iron and Steel Scrap	100,983	85,603	30,172
Ingots, blooms, billets, slabs and sheet bars	150	112	7
Bars, iron	104	130	29
Bars, steel	3,095	1,944	1,432
Bars, alloy steel	443	134	74
Wire rods	3,210	2,062	1,103
Boiler plate	63	76	96
Other plate, not fabricated	3,101	1,593	614
Skelp, iron or steel	532	4,724	167
Iron sheets, galvanized	162	93	88
Steel sheets, galvanized	7,031	3,177	1,510
Steel sheets, black	4,160	4,859	2,306
Iron sheets, black	212	512	76
Strip steel, cold-rolled	957	728	382
Hoop, band, and scroll iron or steel	914	1,246	510
Tin, terne plate	18,971	15,647	4,118
Water, oil, gas, and other tanks except lined	687	221	365
Shapes, not fabricated	1,048	998	637
Shapes, fabricated	1,856	1,488	568
Plates, fabricated	179	298	267
Metal lath	59	83	127
Frames, sashes, and sheet piling	1,166	32	232
Rails, 50 pounds	6,663	7,418	267
Rails, under 50 pounds	2,439	54	94
Rail fastenings	2,828	2,414	64
Switches, frogs, crossings	189	158	16
Railroad spikes	500	644	30
Railroad bolts, nuts	614	221	26
Boiler tubes, seamless	279	283	289
Boiler tubes, welded	62	16	11
Casing and oil-line pipe, seamless	4,492	3,726	387
Casing and oil-line pipe welded	870	701	57
Seamless black pipe, other than casing etc.	367	142	57
Malleable-iron screwed pipe fittings	237	219	136
Cast-iron screwed pipe fittings	128	72	57
Cast-iron pressure pipe and fittings for	125	718	89
Cast-iron soil pipe and fittings for	222	475	317
Welded black steel pipe	1,876	1,407	771
Welded black wrought-iron pipe	73	75	138
Welded galvanized steel pipe	2,136	1,949	1,425
Welded galvanized wrought-iron pipe	39	72	75
Riveted iron or steel pipe and fittings	2	17	3
Plain iron or steel wire	1,016	1,657	374
Galvanized wire	2,330	1,213	357
Barbed wire	3,426	3,116	1,300
Woven-wire fencing	119	57	48
Woven-wire screen cloth	98	36	43
Wire rope	232	372	123
Other wire, manufactures	316	253	194
Wire nails	1,115	984	701
Horseshoe nails	56	51	70
Tacks	43	58	41
Other nails, staples	272	185	200
Bolts, machine screws, nuts, washers	441	357	307
Iron castings	567	969	564
Steel castings	71	224	69
Car wheels and axles	479	1,208	243
Horseshoes	4	25	2
Iron, steel forgings, n.e.s.	323	246	226
Total	184,585	157,600	54,137

WINDOWS OF WASHINGTON

Every Steel Mill a Base?

• • •

NRA Bends Before Congress

• • •

Continuous Mill for Soviet

WASHINGTON

A CRUCIAL period is approaching for steel and other codified industries as NRA enters what is becoming known as the compliance stage, and the safety valve in congress on price and monopoly is popping.

The danger—and it is an imminent one for steel—is that important provisions of codes may be seriously revised or entirely sacrificed in order to placate congress and stem the rising tide of criticism of the consumers' board of NRA, which is claiming and receiving more deference.

Increasingly mindful of the fulminations on Capitol Hill against the possibilities of monopolistic and oppressive practices under the recovery act, NRA can be counted upon to lean over backward in avoiding even the appearance of them.

The federal trade commission, credited with ambitions to succeed NRA and visibly gratified by congressional espousal of it as an agency for preventing monopoly, is becoming more aggressive, and has even dragged the skeleton of Pittsburgh-plus, supposed to have been laid a decade ago, out of the closet.

The trade commission's hands are enormously strengthened by the Borah resolution, adopted Friday, requesting the commission to investigate operation of the steel code. This probably will include open-price as well as basing point provisions. Whether open hearings will be held is not yet known.

Henceforth, no standard cost accounting system will be approved by NRA without a public hearing.

Open-price provisions of codes are under the fire of the consumers' board, and on its recommendation have been stayed as long as 60 days in recent codes pending a hearing.

This attitude is probably the basis for a report that open-price provisions of codes will be considered, and possibly eliminated, at the February convention of code authorities. Imagine the steel code with the basing point and open-price clauses eliminated!

Long the most suspicious of all government officials concerning prices, Secretary Ickes has organized a unit in the engineering division of PWA to check all material prices in three important cities of each state as government protection.

And on the floor of the senate recently, Senators Borah and Nye have been scathing in attacking large industries, reviving the issue of steel bonuses and charging the industry with supporting NRA for the purely selfish motive of profits.

FOR steel, the coming to grips with the trade commission is serious. Of no accomplishment is the trade commission more jealous than that it knocked out Pittsburgh-plus ten years ago, and even though the personnel of the commission has been completely changed, the tradition carries on.

As noted a week ago, considerable mystery surrounds the basing point matter. General Johnson admits having asked the trade commission to investigate and the commission reported direct to the White House.

It has developed, however, in the past week that the trade commission believes the basing point provisions of the steel code to be in direct violation of the decision in the Pittsburgh-plus case. On July 21,1924, the trade commission ordered the respondents, which for all practical purposes were the entire industry:

"To cease and desist . . . . from quoting for sale or selling in the course of interstate commerce their said rolled steel products upon any other basing point than that where the products are manufactured or from which they are shipped."

On its face this order requires that every mill be a basing point. While the number of basing points was increased as a result of this 1924 decision, to possibly a dozen, still it is no secret that "key" points were selected, and in the ensuing ten years no trade commission objected.

Beginning last Aug. 19, when the steel code became effective, exactly 57 cities, excluding all duplications for various products, were made basing points. On pig iron, which the trade commission decision of 1924 did not blanket, there are 23 bases.

All government officials really familiar with the basing point system probably could be counted on the fingers of both hands. The governing factors are that congress is aroused at industry, including steel; the trade commission has the Pittsburgh-plus decision in mind and is apparently disposed to be literal; NRA authorities are not likely to stand out against both.

Assuming the trade commission proposes to stand on the letter of its decision, delivered prices at any given point will vary according to the freight. There would be, of course, the possibility of uniform delivered prices by varying the base price at each mill. Either way, great confusion would be in store for both buyer and seller.

At least two representatives of NRA have attended every American Iron and Steel institute code meeting, with no known objections to multiple bases; hence the deduction that NRA is bending before the storm and not before logic, if it takes action on the price provisions of the steel code. An executive order could emasculate the code.

Incidentally, the way to get a code approved expeditiously is to have a senator or representative on its trail.

WHAT of the 59.06-cent dollar and steel? A highly-placed economist in the government service puts it this way:

"With the dollar stabilized at 59

cents the government can take its profit on gold and the dollar will be cheaper than the present level of prices justifies. The British and French will be able to buy more goods in the United States than at home. For example, the British for about 4 shillings can buy a dollar that will buy more goods in the American market than the 4 shillings would at home. This will encourage foreign purchases here and be a stimulus to prices.

"Many commodities that enter into foreign trade already have discounted this situation, so the effect will be slow. The tendency abroad for devaluation will be strong, and may partially offset our own step. But on steel and other heavy industries the most important effect will not be on prices, but in creating greater stability. Capital investment in projects requiring steel will be encouraged. Uncertainty will be minimized, and for the first time in some months capital will be freed of many fears that have prevented its flowing into channels requiring steel among other things."

According to this economist, improvement thus far has been due not so much to government purchases of gold as to the public and civil works program. If these expenditures enable private industry and demand to "catch" they will pull the country out, he believes. If by July 1, 1935, industry is safely on the road up and the government budget can be balanced, all will be well, according to this authority. If not, a redistribution of wealth and socialization of industry is inevitable.

It is noteworthy that a month ago this economist gave industry only until fall to "catch," and warned of dire consequences in event it failed. Now he is of the opinion that the government can continue to pour out billions for a year and a half.

REPORTS that only a fraction of the government's rail and track fastening program would finally materialize are strongly denied by PWA officials in charge of railroad financing.

Since the new rail price of $36.37½ was set last Nov. 6, actual purchases of rails—some privately financed, others with government funds—total 368,503 tons. The representation of Railroad Co-ordinator Eastman was that 845,525 tons would be placed.

Originally, the railroads signified that they would take about 166,000 tons of fastenings; a recent check raises this to 205,000 tons. The statement is authoritatively made that all promised track material will be placed, and that between March 1 and June 1 the mills will have the bulk of this tonnage to roll.

Much of the holdup is ascribed to the unwillingness of carriers to take rails prior to their laying, which for northern lines will be late spring. Even though interest begins a year after the loan is consummated, deferring this date is a consideration for 1935 budgets. Some carriers also are reported in financial difficulties and unable to provide the "reasonable security" that is required, but the defections on this ground are expected to be few.

Most of the rails to be laid with public money will be 112-pound ones. There is some talk of adding a 152-pound section to the four now recommended by the ARA—90, 100, 112 and 131 pounds.

NEXT to the railroad program, sentiment for a strong navy—springing largely from the expectation of war in the Far East—is steel's greatest ally.

Without a record vote and after only 6 hours debate, the house last week passed the Vinson bill authorizing construction of 65 destroyers, 30 submarines and one aircraft carrier over a 5-year period.

For hulls alone, the estimated steel requirement is 74,750 tons. This is in addition to the PWA naval program, requiring substantially an equal tonnage. Machinery, boilers and other equipment all are additional.

The house's unprecedented action has only served to heighten reports of a conflict between Russia and Japan over eastern Siberia.

German interests are reported to have closed with the Nanking government of China for a blast furnace and steel plant, having an annual capacity of 180,000 tons. The program of the Canton government, also for a blast furnace and steelworks, is reported still pending.

Final statistics on 1933 exports of iron and steel show that shipments of scrap, principally to Japan, totaled 781,349 tons, or 553,827 tons more than in 1932. Next to Japan the heaviest foreign buyers of scrap were Italy and Poland. Washington fancies that the former is making war materiel for Japan and the latter for Russia.

The coast guard last week allocated its seven new patrol boats to navy yards, four to Philadelphia, two to New York and one to Charleston, S. C. For these the hull steel requirements aggregate over 4000 tons. Union labor much prefers naval vessels to be built at government yards.

LOOK for big news shortly concerning Russian buying in this country.

First, probably, will come the organization of a new federal agency—an addition to the great number of alphabet ones—for the purpose of financing Russian purchases here. There probably will be a semi-government guarantee on advances to be made by private interests to Russia.

Rail mills and manufacturers of railroad equipment are expected to be the first to benefit. Presumably to strengthen her defenses in the Far East, Russia, as noted in STEEL for Jan. 15, has a railroad program involving 2,170,000 tons of rails and fastenings, and cars and locomotives requiring upward of 7,000,000 tons of steel. There is, of course, no present assurance as to how much of this business will be placed here.

At the moment, Russia is understood to be negotiating for a continuous strip mill of the type patented by the American Rolling Mill Co. As Washington hears it, this mill would be built in the United States.

Institute

(*Continued from Page* 15)

and bessemer ferrosilicon iron will not make foundry, malleable or basic grades, despite the fact prices for the latter were filed on a Jackson basis, as noted last week in STEEL. The American Rolling Mill Co., it appears, desired to ship pig iron from its Columbus, O., furnace, recently blown in, and was required to use the nearest pig iron basing point, which was Jackson. The shipments are being made to its Butler, Pa., works, and the prices are nominal, at $19.25 for foundry and malleable, and $18.75 for basic.

¶Price filings of the institute the past week included revisions by several producers of stainless steel strip, both hot and cold, and of stainless rerolling billets, in line with some of the changes reported in the preceding week; also the withdrawal of prices at Pittsburgh on one analysis of stainless steel bars, sheets and plates, which was to become effective Jan. 31.

Effective Feb. 10, prices at Worcester, Mass., will be reduced from 7½c to 7c on white liquor finish needle bar, and from 11.50c to 9.10c on ring traveler wire.

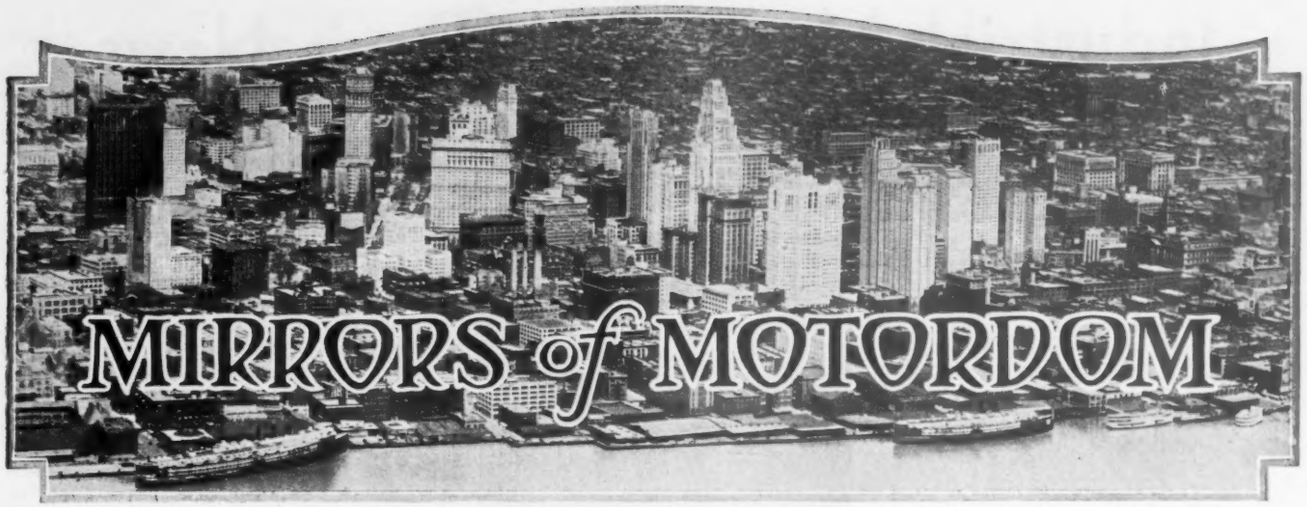
Codes

NRA ADMINISTRATOR Johnson shortly will announce a program for his February meeting with all code authorities.

Contrary to reports, General Johnson stated last week that every effort will be made to approve all pending codes immediately in order to assemble as many code authorities as possible. Presumably this meeting will be held in Washington in the last half of February.

In some recent codes, open-price provisions have been stayed as long as 60 days, which has given rise to the report that open-price provisions of

(*Please turn to Page* 66)



1934 Dies Cost $30,000,000

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Steel Buying Still Is Light

• • •

Stocked Sheets Hardening

DETROIT

THIRTY million dollars is a fair estimate of what the automobile industry has spent fow new dies, tools and fixtures for the changeover to 1934 models. Assuming a production of 2,500,000 passenger cars this year, the average per car figures slightly more than $10.

Individually, dies cost from $8500 up to $150,000 apiece. It is possible for an automobile manufacturer to spend $500,000 to $600,000 for only one set of dies needed for one model of one of its cars. When a producer the size of General Motors through Fisher Body purchases dies for an extensive change, the cost is enormous, running well into the millions.

Further, when a manufacturer this size buys several sets of dies, as is often the case in times of heavy production when more than one assembly line is running, the cost is obviously multiplied. Though many body plants carry only one set of dies, they are in the position of the steel mill that has only a single set of rolls and no spares. A broken die on a "key" part can tie up a body assembly line 6 to 12 weeks.

Steamline design is the chief cause of this higher cost. In this year's models alone, some idea of expenditure may be gained when only the two dies necessary to stamp out DeSoto and Chrysler hoods cost that maker $152,000. Cowl and pillar dies run about $75,000 apiece. Back panel dies, especially with the sloping surface, cost well over $30,000 each.

In fact, the cheapest used is usually the front fender die, and even on the low-priced car this type will cost about $9000, with the same for a higher-priced car as much as $12,000. Radiator dies likewise are expensive, with some running as high as $50,000, even on what is termed the more or less conventionally designed car.

Thus, die costs are not the relatively simple matter that they were in the days of the flat fender, the simple stamping that was a hood and the easily-fabricated back-panel. "Skirts," fender "pants," streamlining, slanted pillar posts, fender wells, hoods and fenders both stamped from a single piece of sheet steel, built-in trunk racks and in-set spare wheels—all have taxed the die designer as well as the producer of deep-drawing sheets.

Counting fender, back panel, rear quarter panels, door panels, cowl, radiator top and all interior dies, the number of which, except the back panel, must be multiplied by two because a left front fender can't be stamped with a right front fender die, you have some idea of the extent of die installations and their costs.

Strike or no strike, some producers showed hand-made cars at the January shows out of choice, not necessity. Before they would trust public opinion with a capital expenditure these producers preferred exhibiting designs on which no production could be run for six weeks. One large maker claims to be offering an extreme-slope to the back of its 1934 models, but hasn't bought the back panel die yet. Another maker completely fooled show visitors by showing a streamlined car with body completely made of wood and few to this day know that it wasn't steel.

Little wonder, then, that at this time until a car manufacturer sees how the public takes his streamlined model, he will not invest in duplicate dies. It is quite commonly understood that there is considerable additional die work of both initial and duplicate nature still current in Detroit.

Of the $30,000,000 estimated as the 1934 die, tool and fixture cost, probably half was placed outside of Detroit when the tool and diemaker strike tied up shops there. Part of this work was recalled later.

STILL slow to emerge from its production difficulties, the industry probably assembled no more than 125,000 units in January.

While February schedules are indefinite, for the reason that capacity rather than sales will be the limitation of most makers, the outlook is for more than 200,000 units this month. If the industry could make 300,000 it could absorb them.

Retail orders continue to mount and it probably will be March before unfilled orders and assemblies strike a balance.

Surprisingly, automotive buying of steel has not kept in step with the heavy strata of optimism Detroit freely offers. Except for a few open-market purchases, largest of which was for 10,000 tons of sheets, steel buying has been largely in 50, 100 and 200-ton lots so far this year. These orders are mainly fill-in and call for sizes which were not stocked so heavily last fall at Detroit motor plants.

Of course, these stocks are being worked down rapidly, and the time when the automotive industry begins to buy steel in quantity again is not far distant. Counting Flint, Saginaw and other outlying- districts along with Detroit, between 400,000 and 450,000 tons of steel was laid down there last fall, but this tonnage has been worked down to less than half that by now.

Generally speaking, with the exception of sheets, this stocking process has resulted in little loss over the past four months. Bars and coiled strip steel have all been taken out of warehouse and storage shed in good to excellent condition. Pig iron

(*Please turn to Page 46*)

Industrial Men in the Day's News

William M. Horton, Factory Manager, Ferry Cap & Set Screw Co.

Educated in New York state, he gained his early experience in the bolt and nut industry there.

For 15 years he was actively associated in production work with the Kirk-Latty Mfg. Co. in Cleveland.

Originator of many new methods in his industry, he also has contributed to standardization efforts.

WILLIAM M. HORTON, who as announced in STEEL for Dec. 25 has been appointed factory manager for the Ferry Cap & Set Screw Co., Cleveland, is a graduate of Port Chester High school, Port Chester, N. Y., and in 1909 of Pratt institute, Brooklyn, N. Y.

Four years he served as apprentice in toolmaking, machine shop practice and drafting at the Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, where he received the groundwork for his knowledge of the manufacture of bolts, nuts and kindred products.

In 1912 he went to Cleveland, where for a period of 15 years he was associated with the late S. D. Latty of the Kirk-Latty Mfg. Co., subsequently consolidated with the Lamson & Sessions Co. In the merged organization, Mr. Horton was assistant director of operations under Maj. R. H. Smith.

Mr. Horton holds many patents on machinery and has been responsible for notable improvements in machinery and methods of manufacturing in the bolt and screw industry. He is a member of the Society of Automotive Engineers, as well as the American Society of Mechanical Engineers, having served as chairman of subcommittee No. 5 on bolt and nut standards of the latter organization.

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H. J. Freyn, president of the Freyn Engineering Co., Chicago, since it was founded, has been elected chairman of the board and has been succeeded to the presidency by Wyman Eaton, recently vice president. Gordon Fox, formerly power engineer, and Alfred J. Ebner, formerly mechanical engineer, have been made vice presidents. L. T. Shorley has been re-elected secretary and treasurer.

Mr. Eaton became associated with the Freyn company in 1919 as chief engineer, later becoming vice president and general manager. Beginning in 1902 he was associated for several years with Julian Kennedy at Pittsburgh, specializing in blast furnace and rolling mill design, following which he joined the engineering department of the Youngstown Sheet & Tube Co. Later he was connected with the William Tool Co., Youngstown, O. In 1915 he became connected with the Mesta Machine Co., Pittsburgh, and for four years was in charge of its rolling mill department.

Gordon Fox entered the Freyn organization in 1920 and has been identified with its power and electrical activities. He has spent the last five years largely in the USSR, where the Freyn company, in association with the Russian organization, Gipromez, has co-operated in the development of the steel industry there. From 1914 to 1920 Mr. Fox was electrical engineer of the Steel & Tube Co. of America and its predecesor, the Mark Mfg. Co., Chicago.

Alfred J. Ebner has been with the Freyn company since 1916, specializing in blast furnace and open-hearth work. He was graduated from the Armour Institute of Technology in 1909, and was successively associated with the National Malleable & Steel Castings Co. and the American Steel Foundries, Chicago, in plant engineering capacities. He is the inventor of a number of processes used in the steel industry.

□ □ □

C. R. Messinger, since Jan. 1, 1931, president of the Oliver Farm Equipment Co. with headquarters at Chicago, has been elected president of the Chain Belt Co., Milwaukee, succeeding his brother, the late C. F. Messinger. At the same time he has been made chairman of the Oliver company. Mr. Messinger originally was made president of the Chain Belt Co. in 1923 but resigned in 1930 to become chairman of this company and president of Oliver company.

M. H. Pettit, formerly vice president of the J. I. Case Threshing Machine Co., Racine, Wis., and the Simmons Co. and Nash Motors Co., Kenosha, Wis., successively from 1923 to 1931, has been made president of the Oliver company. Recently he has been associated with the federal agricultural adjustment administration.

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Alan M. Scaife has been elected chairman of the board of the Pittsburgh Coal Co. to succeed W. G. Warden, resigned. Prominent in Pittsburgh business circles and identified actively with Wm. B. Scaife & Sons Co., Mr. Scaife is also a director in numerous industrial concerns.

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Nathaniel B. Randolph has been appointed assistant general manager of sales of the Granite City Steel Co., Granite City, Ill., effective Feb. 1 He was formerly in charge of the St. Louis office.

Charles H. Dishman, formerly in charge of the Kansas City, Mo., office, has been named district manager of sales with offices in the Boatmen's Bank building, St. Louis.

Richard W. Orthwein, formerly in charge of the Dallas, Tex., office, has been appointed district manager of sales with offices at 916 Walnut street, Kansas City.

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Howard P. Beswick, secretary of Wheeling Steel Corp., Wheeling, W. Va., has resigned because of ill health. J. E. Bruce has been appointed to succeed him.

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George H. Cressler, former vice president and general sales manager of the Stacey Mfg. Co. and vice president of the Stacey Bros. Gas Construction Co., both of Cincinnati, is now associated with the Graver Tank & Mfg. Corp., Chicago. At one time he was vice president in charge of sales and engineering for the Kerr Murray Mfg. Co., Ft. Wayne, Ind., later becoming a member of the firm

of Walker & Cressler, consulting engineers, Chiago. During the war he was a commissioned officer in the army ordnance department, supervising construction of toluol plants on the Pacific coast.

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Arthur H. Young has been appointed vice president in charge of industrial relations for the United States Steel Corp., New York. Since 1924 he has been director of Industrial Relations Counselors Inc., New York, a nonprofit organization advising various companies on these matters. Prior thereto he was for six years manager of industrial relations of the International Harvester Co., Chicago, and previously occupied various positions at the plants and in the operating departments of Illinois Steel Co. and Colorado Fuel & Iron Co.

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Edward L. Ryerson Jr., president of Joseph T. Ryerson & Sons Inc., Chicago, was presented with a bound volume containing letters of appreciation from 153 business, welfare and civic groups of Chicago at the recent annual meeting of the Chicago council of social agencies. Mr. Ryerson is president of the council and the presentation was in appreciation of his services in that capacity.

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Walter Geist, general representative in charge of the sales organization of Allis-Chalmers Mfg. Co., Milwaukee, is leaving for a three-month trip to Europe, Feb. 15.

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Albert J. Vits, executive vice- president of the aluminum Goods Mfg. Co., Manitowoc, Wis., has been elected

(*Please turn to Page* 46)

Died:

HARRY H. WYATT, 48, vice president, Detroit Alloy Steel Co., and secretary and treasurer, Detroit Gray Iron Foundry Co., in Detroit, Jan. 28. Born in Warwick, England, he went to Detroit in 1906. He was a director in both of the above companies.

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Prentiss C. Tilley, 62, president of the Brazil Machine & Foundry Co., Brazil, Ind., in that city recently.

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Paul Maehler, 69, president of the Paul Maehler Co., Chicago, manufacturer of industrial ovens, Jan. 25.

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Wiley J. Dunham, 72, retired president of the Dunham Co., Berea, O., in Fort Lauderdale, Fla., Jan. 22.

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William Torrance Sr., 76, president of John Torrance & Son, LaCrosse, Wis., manufacturers of castings and fabricators of structural and architectural steel products, in LaCrosse, Jan. 21.

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Arthur J. Hofman, 78, retired secretary and auditor, Cleveland Frog & Crossing Co., Cleveland, in that city, Jan. 24. He served the company 30 years, retiring several years ago because of ill health.

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Joseph Skobis, 73, founder and former president, Skobis Bros. Co., Milwaukee, structural steel fabricator, Jan. 25. His elder brother, James Skobis, 79, a co-founder of the firm, died a week previously.

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Henry G. Elfborg, 63, president and treasurer of H. Channon Co., Chicago, ship chandlers, for the past 15 years, at his home in that city, Jan. 30. Coming to this country from Sweden in 1890, he became a civil engineer and was the inventor of several devices used in railroad construction. For a number of years he was with the Ajax Forge Co., Chicago.

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William H. Lloyd, 75, retired sanitation engineer and inventor, in Chicago, Jan. 30. Before his retirement four years ago he was associated with the Standard Sanitary Mfg. Co. and designed a number of improvements in sanitary equipment.

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Henry Chisholm, 55, grandson of Henry Chisholm who founded the Cleveland Rolling Mill Co., Cleveland, in 1868, in Bedford, O., Jan. 29. Previous to his retirement ten years ago he was treasurer of the Champion Rivet Co., Cleveland.

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Henry G. Chapman, 51, vice president and general manager of the Cyclone Fence Co., Chicago, in Pittsburgh, Jan. 30. A resident of Waukegan, Ill., he was attending a code conference of the Chain and Link Manufacturers' association.

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M. G. Spencer, 45, vice president and general manager of the Electric Steel Castings Co., Indianapolis, in that city, Jan. 24. He had long been prominent in the steel industry, beginning his career with the Midvale Co., Philadelphia, later being associated with the ordnance department at Watertown Arsenal, Watertown, Mass. He went to Indianapolis in 1919 and was active in technical society affairs there for years.

Assume New Positions on Executive Staff of Freyn Engineering Co., Chicago

H. J. Freyn

Wyman Eaton

Gordon Fox

EDITORIAL

Rivalry in Materials Is Good For Producer and Consumer

AN ENLIGHTENING commentary on the interest of engineers, designers and operating officials in materials was afforded by the joint meeting on castings development held last Wednesday evening in Cleveland.

As reported on page 30 of this issue, the program consisted of three addresses, each by an outstanding authority in his field. One speaker dealt with malleable castings, another with gray cast iron and the third with cast steel. In all three addresses, recent developments in foundry practice were discussed from the standpoint of the improved properties of the materials. In other words, the program was purposely designed to appeal to users and prospective users of castings.

Ordinarily a regional or local meeting devoted to the discussion of a topic of operating or technical interest attracts an attendance of from 75 to 200 individuals. In the case of the Cleveland meeting, the attendance mounted to the surprising total of 483. Even allowing generously for the fact that the committee of arrangements did an exceptionally good job of press agenting the event, it must be concluded that the unusual turnout reflects a keen interest in progress in the development of materials. The experience should point the way to groups interested in other materials, such rolled steel, forgings, die castings, etc. Similar meetings would go a long way toward familiarizing manufacturers with the improved properties imparted to materials of engineering construction and manufacturing during the past few years.

Trend Toward Alloy Castings Alters Competitive Position of Materials

The discussion of recent progress in the development of castings brought out a number of significant trends, some of which are shared by materials other than foundry products. For instance, in tracing recent progress in the three foundry fields, the influence of the "alloy consciousness" was sharply accentuated. In gray iron and steel casting development, the introduction of alloying elements is virtually revolutionizing the industries. In the malleable field, the more limited use of alloys is broadening the scope of application of the product.

However, aside from extending the use of all three kinds of castings, imparting higher strength and improving other properties, the introduction of alloying elements into cast irons and steels is contributing to another significant result. It is narrowing the gap in the physical properties of all three classes of castings. It increases the intensity of competition.

The importance of this trend cannot be underestimated. It means that the shifts of long established markets from one material to another will appear more frequently in the future than in the past. Applying the same reasoning to materials outside of the foundry field, it means a more active rivalry all along the line.

A glimpse of what may be expected is found in the recent development of camshafts and crankshafts for automobiles. The parts, once sacred to forged steel, now are made successfully in alloy cast iron. At the moment, the cast product seems to have certain advantages which will challenge the ingenuity of producers of rival materials to circumvent. The same story can be told of numerous other applications of materials, wherein metallurgical or other improvements have altered the competitive relations of rival metals.

Rivalry Spurs Producers To Activity; Affords Consumer Greater Selectivity

The increased pace of the race of materials for old and new markets is good for producer and consumer alike. On the one hand it stimulates metallurgical development and promotes improved control in production. There is no question but that marked progress in the development of a given material immediately incites increased activity in the improvement of all competing materials. Evidence of this is found in the spurt of enterprise in casting development which followed closely upon the heels of great advances in the technique of welding and of similar radical developments in products or processes.

On the other hand, improvement in materials is beneficial to consumers. Wider choice is afforded. The manufacturer desiring a metal for a particularly exacting requirement has considerable latitude in selection. While this is a great advantage, it also involves the responsibility of knowing what materials are available and suitable for the purpose at hand.

This in itself is justification for a new and a closer relation between producer and customer —a relationship which can be fostered by meetings similar to that mentioned earlier in this discussion.

THE BUSINESS TREND

Industry Will Watch Effect of Dollar Stabilization

WITH the dollar definitely stabilized at 59.06 cents, placing the United States on an international gold bullion standard, the final props are removed from the complaint that business could not advance substantially under the auspices of a dancing dollar. Events of the next few months should show the extent to which stabilization fulfills the expectancies of higher commodity prices and a resumption of long-term contracting.

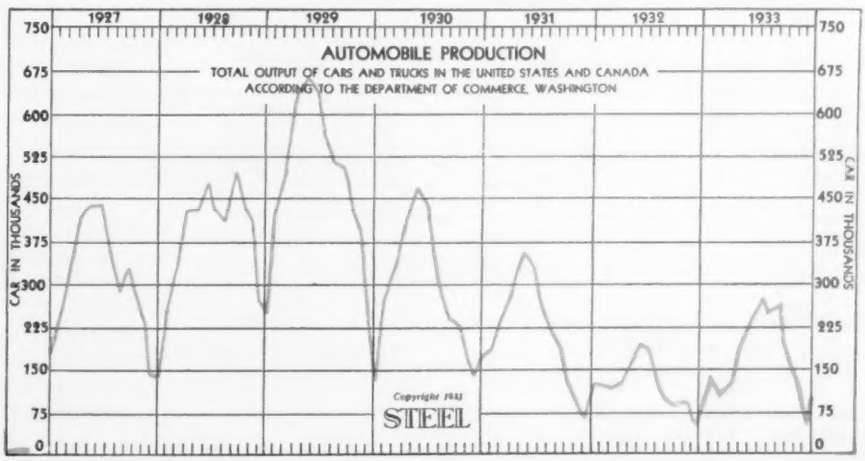
Its effect upon prices will be well worth watching closely. Stabilization has come about through proclamation at a time when Washington is seething with organized protest against higher prices asked by codified industries. In fact, the pressure is so strong that producers are cautious about advancing certain prices, even though they have full justification for doing so because of increased costs. If stabilization should result in another wave of speculative buying, as predicted by many authorities, the present protests would be drowned out in the confusion of active commodity markets.

As for long-term financing—so essential to recovery in the capital goods industries—the outcome rests not only upon the effect of stabilization, but also upon numerous other factors, such as credit facilities as influenced by legislation on securities and on banking operations. When the combined effect of all of these influences produces an atmosphere of confidence, in which private capital can be invested with reasonable hope of fair return, then the heavy industries will move more rapidly toward recovery.

Business generally gained strength in January, but the advance was less pronounced than it might have been had the automobile industry been able to get into production sooner and had PWA projects not lagged. In other words, a portion of activity which might have fallen into the month of January has been pushed into February.

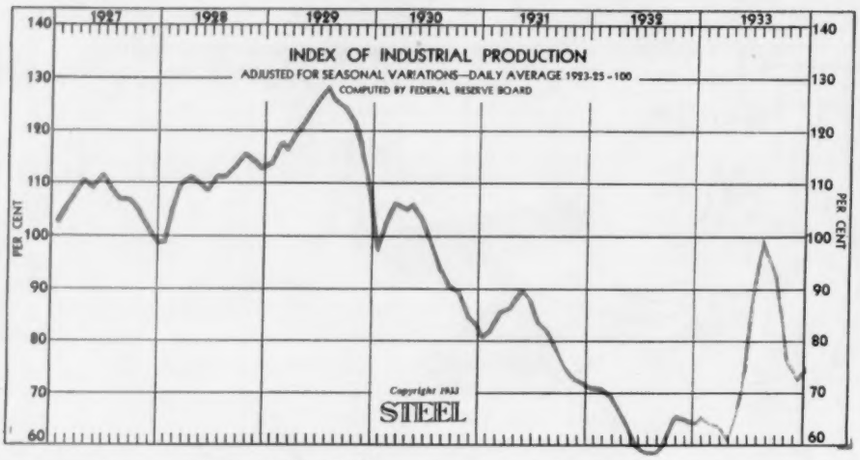
Industrial Activity Maintains Strong Position Throughout January

Weekly reports continue to reflect the present strong tone of business. Car loadings are being well maintained. Steel operations are tending upward. Power output is fluctuating slightly, but is holding above that of corresponding weeks of 1932. The delayed sharp rise in automobile production activities is the most spectacular movement in industry today.



1933	
Dec.	87,307
Nov.	66,195
Oct.	142,157
Sept.	201,890
Aug.	242,566
July	239,628

1932	
Dec.	109,492
Nov.	61,761
Oct.	51,625
Sept.	86,492
Aug.	94,392
July	116,615



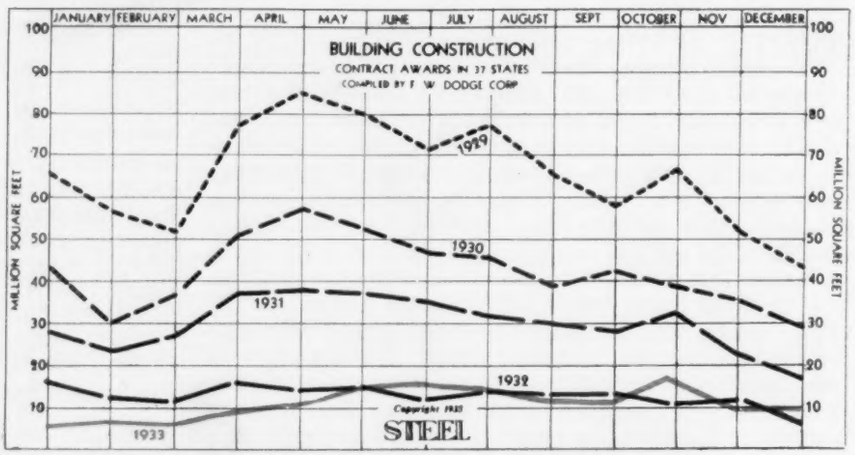
December, 1933	74
November, 1933	73
December, 1932	66

Industrial Production Closes 1933 With Slight Gain

Industrial production in the United States, as reported by the Federal Reserve board, advanced slightly in December. The index figure for the month, adjusted for seasonal variation, was 74. This compares with 73 for November and with 66 for December, 1932. In the manufacturing group the iron and steel production index for December was placed at 61 which compares with 47 for November and 28 for December, 1932.

Building Awards Show No Improvement in 1933

Building awards as measured in new floor space in 37 eastern states remained virtually unchanged in December, having declined only 310,800 square feet from the November level. According to the latest report of the F. W. Dodge Corp., total construction for the last month of 1933 involved 11,451,500 square feet as compared with 6,948,700 in December, 1932. During the year just closed awards totaled 147,053,900 square feet of floor space compared with 155,575,400 in 1932.



	Square Feet
December, 1933	11,451,500
November 1933	11,762,300
December, 1932	6,948,700

December, 1933	92
November, 1933	68.6
December, 1932	31.7

Machine Tool Orders Highest Since May, 1931

The demand for machine tools continues to make impressive gains and the year 1933 ended with production at the highest point in more than two years. According to the National Machine Tool association the three-month moving average for December was 92, which compares with 68.6 in November and only 31.7 in December, 1932. Both shipments and unfilled orders continued to show added strength, the latter advancing nearly 63 points to 178.3.

AN ASSORTMENT of brass die castings produced on a cold-pressure chamber machine. This type of machine uses comparatively high pressures and makes it possible to cast nonferrous alloys at relatively low temperatures. Some of the castings shown here were made available through the courtesy of Walter P. Sherman

RECENT DIE CASTING DEVELOPMENTS OPEN NEW FIELDS FOR PRODUCT

BY SAM TOUR AND F. J. TOBIAS
Lucius Pitkin Inc., New York

DIE casting as practiced in the United States can be defined as the art of forcing into a die molten or plastic material under sufficient pressure to fill the cavity in the die completely. Recent noteworthy developments in the industry have been along three separate and distinct lines—new zinc-base alloys, a new type of casting machine, and a new die steel for use in the production of aluminum die castings.

Introduction by the New Jersey Zinc Co., New York, of new zinc-base alloys with superior physical properties, high impact strengths and negligible dimensional changes has opened new fields for the industry.

Many assembled products containing die-cast parts and articles made entirely of die castings have appeared on the market recently. In spite of the depression, these products were sold in fairly large quantities as the result of their comparatively low cost and high physical properties, combined with a well-organized effort to apply taste to the design and finish of the product.

A few of the articles which might be mentioned are a screw cutting lathe with 43 zinc base die cast parts such as gears, gear housings, gear carriers, pulleys, hand-wheels, and the like; a can opener with nickel-plated zinc-base die cast levers, crank and gears; a kitchen stove, specially designed with more than ten die cast parts; auto heaters; washing machines; and many others.

The use of zinc for zinc-base alloys increased from approximately 30,000 tons in 1932 to 50,000 tons in 1933. The consumption of zinc for this purpose in 1928 was 28,000 tons and in 1929 was 36,000 tons.

The better physical properties of the die casting alloys and the use of somewhat higher pressures have made it possible to reduce wall thicknesses and save material. The thinnest cast wall at present in zinc-base die castings is on a spark plug shield—0.0155 inch. In clock cases, automobile horns, and similar castings, a wall thickness of 0.034 inch is not unusual.

Table II compares Zamak No. 2 (4.0 per cent aluminum, 3.0 per cent copper, 0.05 per cent magnesium, balance high grade zinc) with Zamak No. 3 (4.0 per cent aluminum, 0.05 per cent magnesium, balance high-grade zinc).

Table I

Properties of Copper Alloys Cold Pressure Cast

	Average Tensile Strength, pounds per square inch	Elongation, Per Cent	Brinell Hardness*
85% Cu., 6% Zn., 9% Sn	39,000	1.6	80
86% Cu., 14% Sn	39,000	0.4	96
(x) Manganese Bronzes with 1.4% and 3% Mn	64,000	20.0	115
(x) Tombasil—13.5% Zn., 82% Cu., 4.5% Si	86,000	30.0	140
(x) Delta Alloy—41.61% Zn., 55.94% Cu., 0.72% Pb., 0.81% Mn., 0.87% Fe., 0.34% P	75,000	25.0	150

*Brinell hardness was determined with a 10 millimeter ball, 500 kilogram load for 30 seconds.

Note: (x) before the alloy indicates that the test bars were machined before test and, therefore, figures are somewhat low compared with test bars where the chilled skin has not been removed.

Zamak No. 2, represents the best alloy of the older type, while Zamak No. 3, in the opinion of the authors, is one of the best and most desirable of the new types of alloys.

A new type of die casting machine, developed by Joseph Polak, Prague, Czechoslovakia, using pressures from 4000 to 15,000 pounds per square inch, compared with pressures of 150 to 1500 pounds per square inch in previous machines, makes it possible to cast nonferrous metals and alloys at much lower casting temperatures. In the case of 60-40 brass, for example, this casting temperature is as low as 1575 degrees Fahr.

In a recently published article, William W. Seig, metallurgist, Titan Metal Mfg. Co., Bellefonte, Pa., discussed brass pressure castings. This article was of considerable significance for it presented data resulting from practical experience over an 18 months period of actual production in the United States. Three of these high-pressure machines are in use in the Titan plant.

Termed Pressure Castings

The term "pressure castings" has been adopted by some to distinguish castings made on these new high-pressure type machines from "die castings" as produced on the older types of machines.

In the older types of machines, the metal usually is melted in an iron pot equipped with a submerging cylinder and plunger or a gooseneck as integral parts of the machine. Dr. L. Frommer, in his *Handbook of the Die Casting Technique* published in Berlin in 1933 by Julius Springer, very logically applies the name "machine with a hot-pressure chamber" to these older machines to explain their basic difference with the newer machines with a "cold-pressure chamber." In the new high-pressure machine, the metal pot is separate from the actual machine and the molten material to be cast is transferred before every shot by means of a hand ladle into a cold cylinder which is a part of the machine proper.

Machines of the cold-pressure chamber type are economical for the production of castings from many nonferrous metals. To date these machines have been used largely for producing brass castings. The following data taken from the article by Seig are indicative of the experience of 1½ years of actual production in this country:

Weight of castings, pounds.....Up to 11
Approximate shots per hour.....126
Hydraulic pressure, pounds per square inch 3000-6000
Casting temperature of brass, degrees Fahr. 1575
Usual alloy composition, per cent.....Cu. 60.0; Zn 38.75; Pb. 0.75; Sn. 0.50
Greatest die life experienced, shots (Special die steel used)....121,000

Seig also gives data on an alloy called "Tinicosil" containing 16 per cent nickel with a tensile strength of 90,000 pounds per square inch, and data on test bars of zinc-base alloy Zamak No. 2 (4 per cent aluminum, 3 per cent copper, 0.05 per cent magnesium, with an average tensile strength of 58,400 pounds per square inch and 6.2 per cent elongation in 2 inches. Impact strength is not given by Seig but on this alloy should be between 10 and 15 foot-pounds.

Impact Strength Raised

Seig gives no data on Zamak No. 3 (4 per cent aluminum, 0.05 per cent magnesium) alloy as produced on a "cold-pressure chamber" type of machine. One of the authors has found a tensile strength of 40,000 to 45,000 pounds per square inch, average elongation in 2 inches of 6 per cent and impact strengths of 15 to 25 foot-pounds.

—Courtesy New Jersey Zinc Co.

Better physical properties of alloys and use of slightly higher pressures have made it possible to reduce wall thicknesses in zinc-base die castings. In automobile horns, such as shown here, a wall thickness of 0.034 inch is not unusual

The physical properties of a zinc-base alloy containing over 20 per cent aluminum and some copper and magnesium, balance high grade zinc, may be of interest from the standpoint of greater lightness:

Average tensile strength, pounds per square inch 45,000
Approximate elongation in 2 inches, per cent..... 1.0
Approximate impact strength, foot-pounds 6.0
Expansion per inch after 10 days in water vapor of 95 degrees Cent., inches 0.001

In Europe, copper alloys of the compositions and properties shown

Table II

Comparison of Zinc-Base Die Casting Alloys

Data from New Jersey Zinc Co. and Tests Made by Authors

		Steam Test 95 Deg. Cent.		Annealed at 95 Deg. Cent.			Indoor Aging		
	As Cast	5 Days	10 Days	6 Months	1 Year	2 Years	1 Year	2 Years	3 Years
AVERAGE TENSILE STRENGTH IN POUNDS PER SQUARE INCH									
Zamak 2.....	47,000	46,000	45,000	40,000	39,000	38,500	48,000	48,500	49,000
Zamak 3.....	37,000	35,000	33,000	32,000	31,000	30,000	35,000	35,000	35,000
AVERAGE IMPACT STRENGTH IN FOOT-POUNDS									
Zamak 2.....	15.0	4.0	1.5	1.25	1.25	1.25	12.75	9.75	6.0
Zamak 3.....	20.0	20.0	19.0	18.50	21.00	16.50	20.25	19.00	19.75
AVERAGE ELONGATION IN PER CENT IN 2 INCHES									
Zamak 2.....	8.4	1.6	1.0	1.3	1.2	1.1	6.7	7.5	5.4
Zamak 3.....	5.3	5.1	4.0	9.0	8.0	7.0	8.0	7.5	5.4
AVERAGE EXPANSION OF 6-INCH IMPACT BARS IN INCHES									
Zamak 2.....	— —	+0.0073	+0.0118	+0.0210	+0.0212	+0.0214	—0.0003	+0.0006	+0.0022
Zamak 3.....	— —	+0.0031	+0.0045	+0.0015	+0.0010	+0.0012	—0.0004	—0.0004	—0.0006

in Table I are being cast in machines of the "cold-pressure chamber" type. (See W. Brunnckow "Stand und Erfolge des Pressgussverfahrens" Z. F. Met. Kunde 25, No. 8, Aug. 1933, pages 190-194).

Silver 800/1000th fine can also be cast on this type of machine.

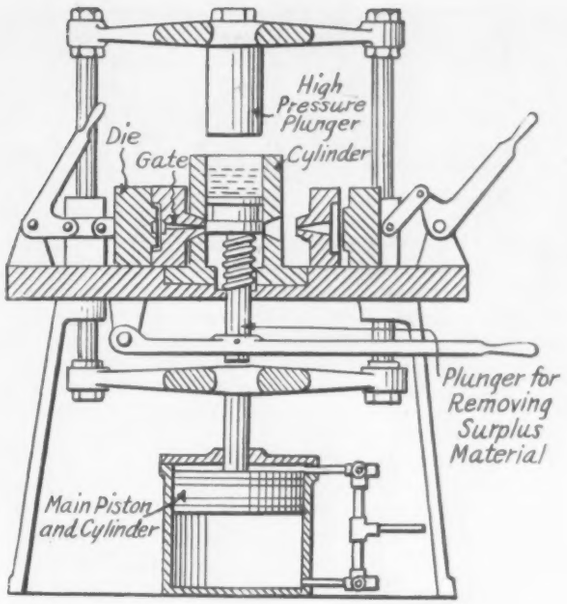
In casting aluminum alloys in the ordinary type of die casting machine, the iron picked up from pot, gooseneck and nozzle always is a troublemaker. Iron over a certain amount, depending largely on the alloy composition, affects the physical properties, increases hardness, and makes machining of the casting more difficult. Corrosion resistance and response to anodic oxidation and coloring treatments are also very much influenced by iron content.

Iron Proves Detrimental

Dr. Frommer states that increasing the iron content from 1.1 per cent to 2 per cent in Silumin (Alpax), an aluminum alloy containing approximately 11-13 per cent silicon, reduces the impact strength 68 per cent. The solvent action of the molten aluminum alloy on gooseneck and pots makes frequent replacing of these parts necessary and so increases the maintenance costs of the machine.

Sponginess or porosity in ordinary aluminum die castings is very materially affected by casting temperatures. Excessive temperatures result in increased sponginess. The use of a cold-pressure chamber casting machine with the available higher pressure for casting makes possible the production of die castings at lower temperatures. These lower temperatures combined with the much higher pressures result in increased density, improved physical properties and corrosion resistance of the product.

Frommer gives interesting figures on aluminum-silicon alloys as cast in a cold-pressure chamber machine.



SCHEMATIC diagram of a cold-pressure chamber die casting machine. Operating pressures in this type of machine range between 4000 and 15,000 pounds per square inch

The ordinary 13 per cent silicon-aluminum alloy does not have age-hardening properties but the addition to it of 0.5 per cent manganese and 0.3 per cent magnesium seems to give it such properties. This alloy when die cast is chilled in the die so rapidly that it may be considered to be in the "as quenched" condition. Reheating to 150 degrees Cent. (302 degrees Fahr.) for about 20 hours develops changes in physical properties as shown in Table III.

This modified silicon-aluminum alloy in the unaged condition is known in Germany as "Silumin Beta" and in the aged condition as "Silumin Gamma." The iron content must be very low. The casting of this and similar aluminum alloys made economically possible by the cold-pressure chamber machine should open new fields for aluminum die castings.

Magnesium alloys may also be cast with the cold-pressure chamber machine. Some castings have been made on such machines, but data on physical properties are not at hand. An alloy of approximately 89.7 per cent magnesium, 10 per cent aluminum and 0.3 per cent manganese (Electron) may be used.

It would be too broad a statement to say that this newer type of machine will replace the old type, but it can easily be said that the introduction of the cold-pressure chamber machine in the United States already has opened the brass field to the die casting industry, and will open new fields for aluminum, magnesium and zinc base alloy die castings in the near future.

Seek New Die Steels

Intense research in new alloys and in die steels for use with brass to increase the economy of this newly developed field is essential and is in progress.

In actual service aluminum die casting dies are subjected to sud-

(*Please turn to Page* 30)

Table III

Physical Properties of Silicon-Aluminum Alloys

Data as Given by Dr. L. Frommer

Alloy	Composition in Per Cent: Silicon	Manganese	Magnesium	Iron	Aluminum	Tensile Strength, Pounds per Square Inch	Elongation, Per Cent	Impact, Foot-Pounds	Machine Type	Brinell Hardness
*Silumin A.....	12.0	....	....	1.5	Remainder	32,000	0.8	2.00	Hot Pressure Chamber (Gooseneck)	93.5
*Silumin B.....	12.0	....	....	2.0	"	29,000	0.6	0.82	" " "	83.3
*Silumin C.....	12.0	0.6	....	0.8-1.8	"	.....	...	2.33	" " "	....
*Silumin D.....	12.0	0.6	....	2.1	"	.....	...	1.60	" " "	....
*Silumin E.....	13.0	....	....	1.35	"	36,000	...	1.80	" " "	....
*Silumin F.....	13.0	....	....	1.9	"	28,000	...	0.78	" " "	....
*Silumin G.....	10.0	....	....	1.3	"	30,000	1.6	....	" " "	....
*Silumin H.....	10.0	0.7	....	1.0-1.5	"	33,000	1.7	....	" " "	....
Silumin E.....	13.0	....	....	....	"	40,000	3.5	....	Cold Pressure Chamber (Polak Machine)	86.4
Silumin Beta.....	13.0	0.5	0.3	....	"	41,500	1.7	....	" " "	72-88
**Silumin Gamma	13.0	0.5	0.3	....	"	48,000	1.2	....	" " "	122

*Silumin A to H represents different heats of alloys.
**Silumin Gamma represents Silumin Beta test bars annealed at 302 degrees Fahr. for 20 hours.
Impact tests made on unnotched test bar sections of 0.0985 x 0.3152 inch (2.5x8 millimeters).

Speed Nuts "Zip" on; Aid Assembly of Metal Parts

LEADING automobile, refrigerator and electrical equipment manufacturers are adopting a novel fastening device developed incident to stove and range production. For speed and security in assembling metal parts it apparently has a wide field of usefulness, as new applications are continually coming to light.

One of its chief advantages so far has been in the automobile industry where it is being used by 11 companies, including General Motors and Chrysler units. An engineer for one of the low-price cars has figured out

THE SPEED NUT: Spring steel, arched, with prongs extended and set at an angle to engage bolt threads

100 places where it may be employed.

As so often is the case, in finding the answer to one's own manufacturing problem, one also solves similar difficulties confronting others. In assembling enameled sheet steel and castings, a range manufacturer found he could not use drive screws without damaging the enamel. He could not bolt up the parts to make them rigid without the finish subsequently suffering from expansion and contraction of the metal. Certain parts to be fastened were nearly inaccessible. Besides, there always was the necessity for speed.

He devised what might be described as a combination nut and lockwasher, as it serves both purposes. In its usual form this is a piece of spring steel ½ x 1-inch, slightly arched lengthwise, with a diamond or round hole in the center, and slit so as to form two prongs of even width which are bent outward and at an angle to engage the threads of a bolt or screw. The width of the hole is slightly smaller than the diameter of the bolt at the base of the threads.

The thickness of the material varies from 0.010 to 0.025-inch, depending on the size of the bolt to be used. The width ranges from ¼ to 1⅛ inches, and the length from ½ to 1⅛ inches. It has been found practical to use speed nuts 1¾ inches long for holding firmly bolts ½-inch diameter.

More convenient than the individual speed nuts, for some assemblies long strips are provided, with the nut element stamped at regular intervals, in coils up to 1600 feet; or with irregular spacings in individual sections.

The steel from which the nuts are made contains 0.70 to 0.80 per cent carbon. It is heat treated after forming. Due to the analysis of the steel, as well as to their shape, the nuts have a high degree of resiliency.

In use, the bolt is pushed through the bolt holes in the parts to be assembled, and the speed nut resting on the ends of the fingers is simply "zipped" on over the bolt. One or two turns of a screw driver—and it is there to stay. The parts are held firmly, yet the resiliency allows for expansion or contraction of the parts and also for vibration. The permanently tight grip which it holds, even under vibration, is one of the reasons the automobile industry is using it.

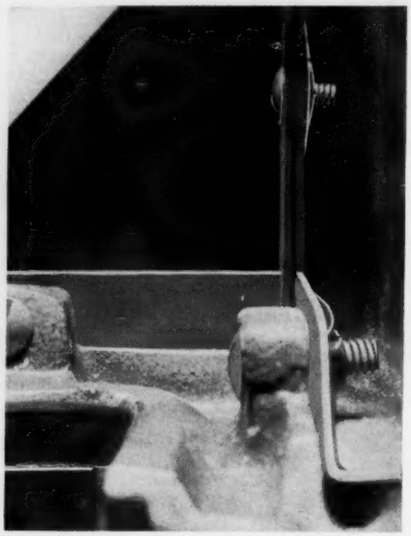
Simplifies Assemblies

The speed nut's locking action is so strong that for many assemblies, bolts or screws are not required. For example, some manufacturers of containers now hold steel spacer rods in place by merely pushing the nuts over ends of unthreaded rods. Similarly, spacers for armored floor guards are held in position. The maker of illuminated letters and numerals for road signs fastens the characters to base plates in the same manner.

While the speed nuts were developed by A. H. Tinnerman, president of the Tinnerman Stove & Range Co., Cleveland, primarily to meet requirements of his own company, here is a rather unusual sequel—other stove and range companies now are purchasing them.

They are used for assembling metal furniture, office partitions, cabinets, shelving, lockers, window sash, children's vehicles, radios, and, with suitable rounded projections, for holding down tubing, cords and wires.

A variety of finishes is provided besides the natural blue of highly tempered spring steel, including nickel and cadmium plated. Bolts, whose heads are to be exposed, may be plated and polished, yet used with blued steel nuts which are concealed in the assemblies. Brass bolts may be employed, without the risk of any cutting action on the threads. Some of the smaller nuts are made of very thin bronze. Many different shapes and sizes have been adopted, all carrying out the general ideas covered in basic patents held by Mr. Tinnerman.



AN INTERESTING ASSEMBLY: In this practical example of stove construction, enameled sheets and enameled casting are held firmly together by bolts and speed nuts

Due to their general adoption in the refrigerator industry they have facilitated the trend toward the use of steel frames, instead of wood, as they provide the necessary resiliency and eliminate cracking of the enamel.

Many special forms have been devised to meet unusual conditions. For instance, in "blind" places, where it is expensive or impractical to provide

NUT IN STRIPS: The typical speed nut stamping is spaced at regular intervals in steel coils up to 1600 feet in length; or at irregular intervals, in sections

ANNOUNCING—A GREATLY IMPROVED S.A.E. 3100 SERIES

To those interested in better steels for transmission and differential gears, suspension parts, king pins and other carburized applications, Republic now offers an improved series of S.A.E. 3100 steels. « « « In analyses, these new Republic steels do not differ from standard 3100 compositions. In metallurgy and performance, they are markedly superior. As a result of Republic developments in metallurgical control, these new 3100 steels are made to closer grain specifications. Their greater hardenability and freedom from distortion open the way to desirable production economies. « « « In actual practice, these new Republic S.A.E. 3100 steels are giving better performance in many applications for which higher cost alloys are conventionally used. It will pay you to investigate. « « « « « « « « «

CENTRAL ALLOY DIVISION, MASSILLON, OHIO

REPUBLIC STEEL
CORPORATION
GENERAL OFFICES YOUNGSTOWN, OHIO

ACATHON STEELS

the conventional type of fastenings, holders are spot welded or riveted onto the material, and the speed nuts are slipped into the holders before assembly. The bolts then are simply pushed through holes and engage the nuts.

In another form, the nuts are flanged in the shape of clips, to slip on over the edge of one of two pieces of metal to be assembled. The edge of the other piece then is lined up. Bolts are thrust through the holes, and the nuts "zipped" on over the ends of the bolts. Speed nuts also may be welded to parts not subjected to high heat in finishing.

Of course, in all cases the bolts may be withdrawn from nuts, if desired, by means of a screw driver. Threads are not damaged.

Engineers Told of Progress in Gray Iron, Malleable and Steel Castings

NEARLY 500 engineers and others interested in the application of castings attended a meeting on castings development held Wednesday evening, Jan. 31, in Hotel Statler, Cleveland. The meeting was held under the joint sponsorship of the American Foundrymen's association, the Cleveland Engineering society and the Cleveland section of the American Society of Mechanical Engineers. Dan M. Avey, editor of *The Foundry*, presided.

Harry A. Schwartz, manager of research, National Malleable & Steel Castings Co., Cleveland, described the practice and equipment employed in the production of malleable, discussed the metallurgy of the product, enumerated its various physical properties and touched on a number of typical uses.

Dr. Schwartz exhibited a chart showing changes in A.S.T.M. specifications for malleable cast iron dating from 1903 to 1933. He called attention to the two grades of malleable covered in the 1933 specifications and commented upon the fact that the railroads generally specified the higher strength castings and that the automobile industry, the largest consumer of malleable iron, prefers castings of lower strength but with greater machinability. In conclusion, Dr. Schwartz described a number of variations of malleable cast iron in which alloying elements have been introduced.

Trend to Higher Strength

Fred J. Walls, metallurgist, Eaton-Erb Foundry Co., Detroit, discussed gray cast iron. He touched upon important developments in the last three years and emphasized the growth of the centrifugal and permanent mold processes and the unmistakable trend toward high strength cast irons, obtained through the use of nickel, molybdenum, chromium, titanium and other alloying elements.

Mr. Walls exhibited a number of slides showing alloy iron castings for brake drums, camshafts, crankshafts, boiler forming dies, crusher rolls, and the like.

Major R. A. Bull, foundry consultant, Chicago, described the steel foundry industry, stating that it consists of about 275 plants whose average output per month varies from 25 to 7000 tons. The annual capacity of the industry is about 2,000,000 net tons per year and the value of product, when the industry is operating at capacity, is about $175,000,000.

Major Bull traced the development of steel castings and stressed the "alloy consciousness" which has marked the trend in steel casting progress during recent years. He declared that recent interest in welding of rolled steel and the recent introduction of high-strength cast iron also have helped to stimulate steel foundry practice.

Upper Limit Not Specified

In commenting upon specifications for steel castings, Major Bull declared that the 150,000 pounds per square inch tensile strength provided in specifications for certain alloy steel castings does not represent the upper limit of strength obtainable. Some steel foundries, he said, are working to 200,000 pounds stipulated in private specifications. Strength as high as 225,000 pounds are found in test bars.

The speaker cautioned engineers and designers against issuing specifications in blind adherence to high strengths and exact chemical analysis. He urged that buyers co-operate with the foundrymen to the extent of giving him some leeway in connection with strengths and analysis in order that he may provide a casting best suited to the consumer's needs.

Standardize Preparation of Metal Micrographs

Standard rules governing the preparation of micrographs of metals and alloys, drawn up by committee E-4 of the American Society for Testing Materials, have been approved as standard by the American Standards association and designated Z30.1 1933. The recommendations cover magnifications for general use in the preparation of micrographs for metallurgical studies of metals, methods of measurement of grain size, and methods of expressing and specifying grain size of metals.

Included in the standard is also a recommended practice for photography as applied to metallography. An appendix outlines recommended practice for the care of the eyes when using a metallographic microscope.

Copies of the standard may be purchased from the testing materials society, 260 Broad street, Philadelphia, for 25 cents each; or may be borrowed or purchased from the standards association, 29 West Thirty-ninth street, New York.

Die Casting Developments Opening New Fields

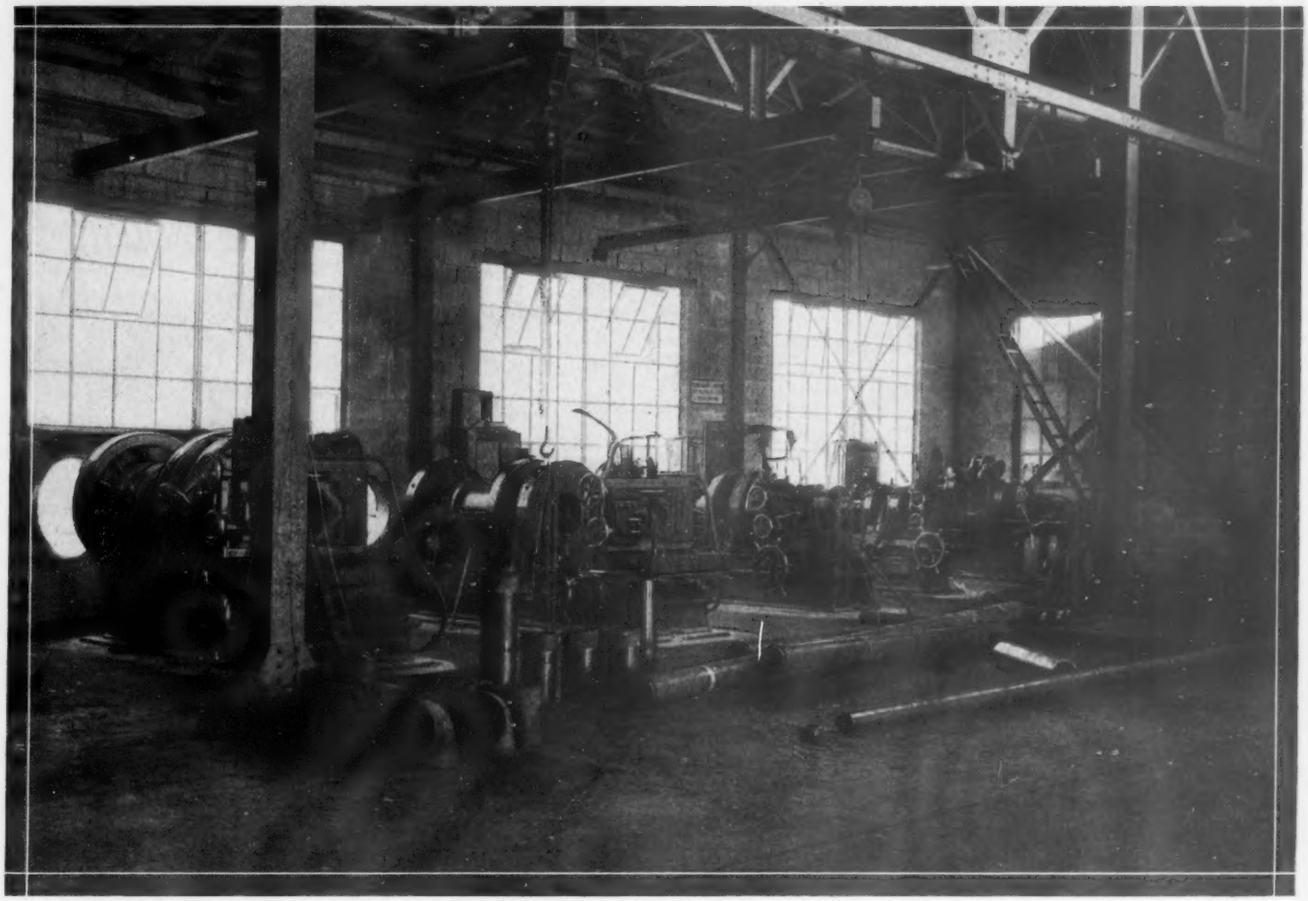
(*Concluded from Page 27*)

den stresses due to local and sudden heating as the molten metal is forced into the die. Die steels fail by developing fine heat checks or large cracks. Failures are accentuated by the presence of small surface imperfections such as scratches and this indicates that the concentration of stresses due to sharp angles or notches must be taken into consideration in comparative studies of die steels. High notched bar impact strength at both room temperature and at the elevated temperatures at which these dies operate would seem to be desirable.

In addition to notched bar impact toughness, a good die steel for aluminum die castings should have a fair degree of resistance to the erosive action of molten aluminum alloys, satisfactory machinability in the annealed condition, should show little movement or distortion upon hardening and should be available at a cost which is not prohibitive.

With these aims in view and as the result of considerable experimental work on steels of various compositions, James P. Gill, metallurgist, Vanadium-Alloys Steel Co., Latrobe, Pa., has developed a new die steel containing approximately 0.30 per cent carbon, 1.00 per cent silicon, 5.00 per cent chromium, 1.00 per cent tungsten, and 1.50 per cent molybdenum. This new steel is a considerable improvement over previous steels available to the die casting industry and makes the production of aluminum die castings a more economical process and, therefore, makes possible a further extension of the field of application of the product.

If you want dependable pipe threading equipment— specify "LANDIS"



The battery of LANDIS Pipe Threading and Cutting Machines shown above typifies the dependability that is built into all LANDIS equipment.

This installation, located at Port Jerome, France, was used in the erection of a modern oil refinery.

Dependability in operation and the absolute assurance that the threads produced would make pressure-tight joints were the factors governing the selection of equipment.

That LANDIS machines were installed tells the whole story.

May we send you literature on LANDIS Pipe Threading Equipment?

LANDIS MACHINE COMPANY, INC.

WAYNESBORO, PA.

Steel Frame Is Essential in Modern Home Construction

BY ALEXANDER MILLER
District Engineer, American Institute of Steel Construction

MODERN residences, regardless of design, should be considered in terms of construction which will produce a fireproof and non-shrinkable frame, and at the same time be composed of materials which are readily available.

Usually the owner builds but one home, and in that he puts the savings of many years. His first thought is, "Will this home sell if it becomes necessary for me to reside in another city; is it the type of home someone else would want?" These and many other questions must be satisfactorily answered before we can expect him to invest the savings of a life-time.

We are then faced with the problem of understanding our markets, and merchandising these materials which are vital to firesafe construction.

Recently a prospective home owner hired an architect to design his new home. The architect, knowing he wanted a brick exterior, asked him if he wanted a modern house, with a steel frame, and explained to him the merits of firesafe construction. The owner, not knowing the importance of this type of construction to the safety of his family, became interested. He was pleased when he learned there was only a small advance in the first cost and, all things considered, it would actually cost less than the old method.

Co-operate with Architect

When this desire for a modern home is created, we should co-operate with the architect in an effort to furnish the owner fireproof construction which will not shrink, thereby avoiding plaster cracks and the necessity of re-decorating at frequent intervals.

While we are making our home safe from fire within, we are at the same time removing the danger of thunder storms. The late Dr. Charles P. Steinmetz, an authority on lightning, said: "I can think of just three places where you will be absolutely safe in a thunderstorm: One is an underground chamber. Another is a space entirely surrounded with a metal network. The last—and the only one of which you are likely to be able to take advantage—is a steel-framed building."

Residents in earthquake zones or in tornado districts should welcome steel-frame construction. Many who were lost in the recent quake and flood would be here today if they had been housed in structures designed to resist shock, and anchored to their foundations.

Again, those who are familiar with hospitals, know that metal and clay products have greatly aided in the fight against insect pests. Our homes also should be made vermin-proof.

The idea of standardizing residence construction has been suggested, and districts of first-class residences have been built, only to discover that the public is not interested in residences which have a similarity of appearance. In districts where no street has two houses of similar exterior, we find a much greater demand. This would seem to indicate that the prospective home owner continues to need the services of an architect in the proper development of his ideas.

Flexibility Is Possible

This in no way restricts the use of steel. With modern equipment, steel may be readily cut and welded to develop a rigid frame, regardless of how complicated the architect's details may be. Plumbers, steamfitters and electricians in the past have looked unfavorably on this type of frame, because in their opinion, floor and wall members can not be cut away readily to allow for pipes and fittings. However, where the architect furnishes accurate dimensions, locating these members, practically all of the material can be cut in the shop and assembled on the site at a decided saving.

In steel-framed residences, continuous standard I-beam sections, properly fireproofed with tile and supporting a non-shrinkable subfloor, make a satisfactory floor construction. The exterior wall studding may be of standard 3-inch I-beams and channels fastened to a 3-inch I-beam sill top and bottom. The reinforced brick veneer may be readily fastened to these members by means of a notched plate, laid in the mortar joint, and hooked around the flange of the studding. The same method may be used for holding the 3-inch reinforced hollow clay tile on the inside of the frame. These tile units are laid in alternate directions so that their hollow interiors form individual dead air cells, which with a 3-inch confined air space separating the brick and tile, provide efficient insulation and a very satisfactory type of construction. Tile units of the same section are used for the interior walls, and plaster is applied direct to the tile on both walls. The average 8-room residence requires about 10 tons of steel.

Another type of floor, which is receiving favorable consideration for office buildings and schools and which may be readily used for residences, is the steel plate floor known as "battledeck" construction. By the use of steel plates and ordinary structural steel beams, we have developed a welded steel floor, which is fireproof, light in weight, of predetermined strength, producing a floor of minimum thickness. Being erected with the frame, it furnishes a working floor at once. Tests made for strength, fireproofing and sound-conductivity have exceeded all expectation. For residences, the floor may be covered with wood, cork, rubber tiling, or other resilient covering.

I cannot agree with those who claim we should have cheap construction. That is the cause of a great deal of our trouble today. Some speculative builders have taken adadvantage of prospective owners by lowering the standards of construction. The public has been indifferent, simply because financial investment organizations have failed to differentiate in their appraisals between modern construction and the type which has been represented as being modern.

Progress in residence construction will depend upon more intensive studies of markets with practical plans to meet new requirements. We must accept this challenge with intelligent and courageous effort.

From an address before the annual convention of the Brick Manufacturers' association, Cleveland, Jan. 24, 1934.

World's Fair Buildings Are Reproduced in Color

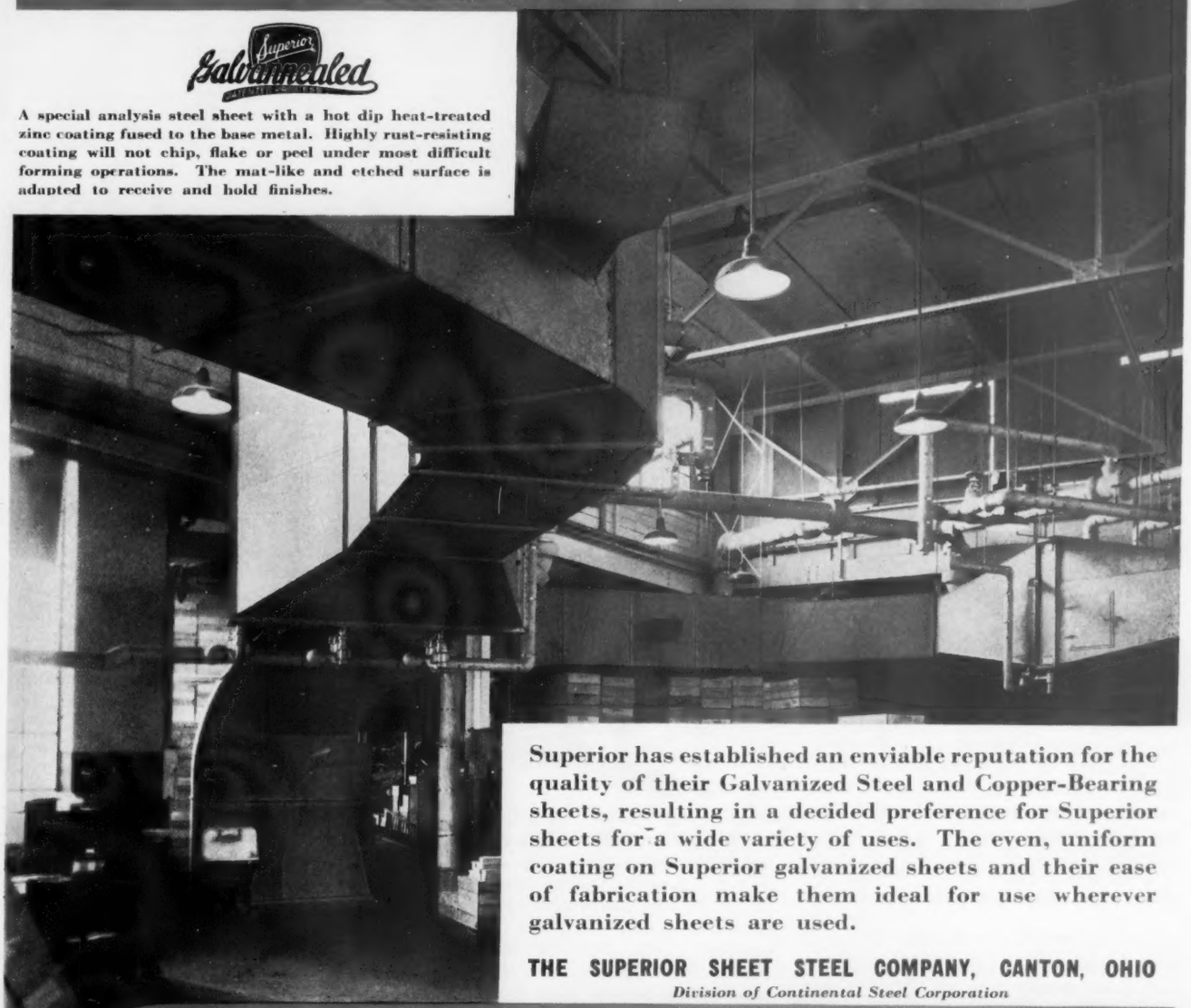
The American Asphalt Paint Co., 43 East Ohio street, Chicago, is distributing a brochure, "Color and Protection," containing authentic water-color illustrations of A Century of Progress exposition. This company had the contract to furnish and apply the paint for both the inside and outside of all major World's Fair buildings.

Printed in 13 water colors, silver and gold, the 16-page souvenir book contains 35 fine reproductions of the buildings in their actual colors. Readers of STEEL may obtain copies of the brochure by addressing the American Asphalt Paint Co. on company letterheads.

SPECIALISTS IN *COATED* SHEETS

Superior Galvannealed

A special analysis steel sheet with a hot dip heat-treated zinc coating fused to the base metal. Highly rust-resisting coating will not chip, flake or peel under most difficult forming operations. The mat-like and etched surface is adapted to receive and hold finishes.



Superior has established an enviable reputation for the quality of their Galvanized Steel and Copper-Bearing sheets, resulting in a decided preference for Superior sheets for a wide variety of uses. The even, uniform coating on Superior galvanized sheets and their ease of fabrication make them ideal for use wherever galvanized sheets are used.

THE SUPERIOR SHEET STEEL COMPANY, CANTON, OHIO

Division of Continental Steel Corporation

SUPERIOR

COATED SHEETS FOR MANUFACTURING PURPOSES

Making the Most *of* METHODS AND MATERIALS

A MANUFACTURER of steel equipment employs cadmium plating to protect and beautify certain parts of its filing cabinets. When the drawers are pulled out, the metal suspension members are in full view and the finish on these parts must not only prevent unsightly rust but must remain bright so as to harmonize with the enamel on the drawers and sides of the cabinet. New all-welded construction keeps the drawer openings rigid under all conditions and prevents possibility of frame side bulging. The entire frame construction has been increased in weight and in keeping with it the drawers are made of heavier gage metal.

$ $ $

Monel metal, aluminum, stainless steel and other nickel alloys now are beginning to receive attention for parts of the process piping in breweries, particularly in the fermentation and storage cellars. The use of these metals in pipelines undoubtedly will follow their adoption for tanks and other equipment, and welding most certainly will find a place in the joining of these lines and fabrication of fittings.

$ $ $

Chromium finishes on a variety of flat-rolled metals may be obtained in sheet, strip or continuous coil form. For fabricating many products the use of such material frequently is preferable to the application of chromium to the finished article after its manufacture. The various base metals available include zinc, steel, tin plate, brass, copper and nickel silver.

$ $ $

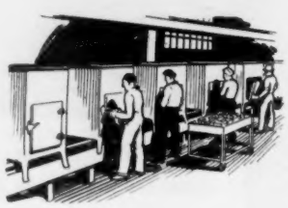
AN INVESTIGATION on the strength of welded joints in tubular members for aircraft has been extended to cover tests on heat-treated welds of thin-walled tubing. Special attention is being paid to methods of preventing heat cracks, including a study of welds made by a new process, using a carbonizing flame and a special low melting point rod. Tests so far have indicated that this new process gives somewhat stronger welds.

$ $ $

A nickel-chromium alloy pot for case hardening steel gears which is finding a wider use has an open core in the center that allows improved heat circulation and is claimed to provide more uniform heating than a solid pot.

$ $ $

Dirt or black specks is a common source of trouble in porcelain enameling, the chief cause seeming to be the presence of small iron particles in both the ground coat and cover coat enamel slips. This contamination results from the abrasive action of the enamel on the exposed iron portion of the mill door and mill door frame. As a solution, rubber-covered mill doors



and frames are recommended as standard equipment for all mills, particularly cover coat mills. Practically all of the cover coat mills used by large refrigerator manufacturers are so equipped. Iron particles can be removed from ground coat enamel by passing the enamel in a thin stream slowly over a magnetic separator which pulls out the particles.

$ $ $

There is no danger of obtaining too much light under modern sources of artificial illumination, properly applied. The best lighting systems supply really meager light compared with the intensities of daylight. The desirable quantity of light for any particular installation depends upon actual conditions, such as the accuracy of the operation, the fineness of detail to be observed, and the like. Many installations supplying 25 to 50 foot-candles of general lighting now are in use with supplementary illumination of from 100 to 250 foot-candles. These have proved to be profitable and practical as it is found that benefits derived more than offset the slight additional cost of operating such a system.

$ $ $

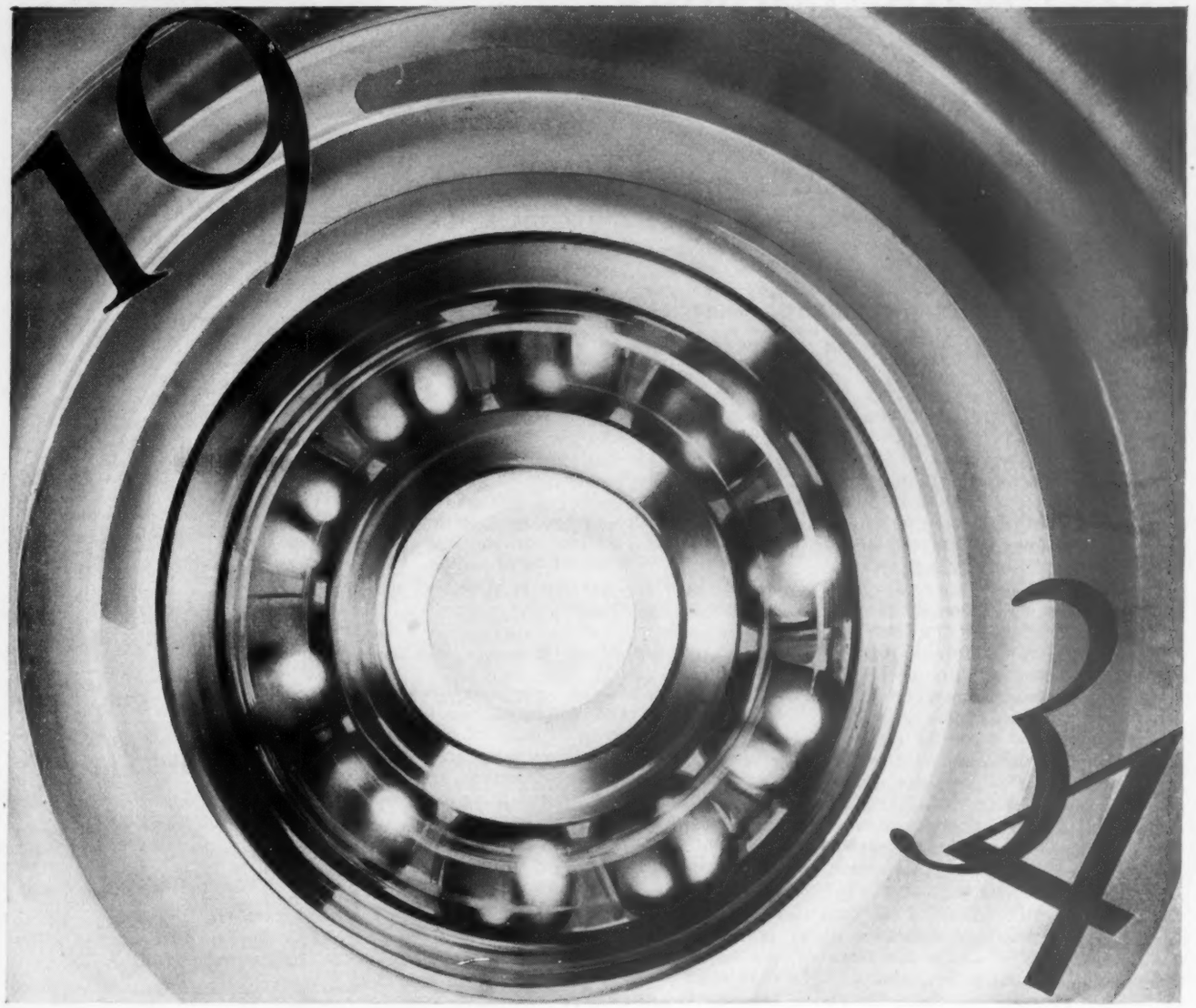
EVIDENCE of the special usefulness of nickel cast iron is presented in the fact that practically every important automotive manufacturer and body builder in the Detroit area is specifying the material for dies ranging from a few pounds to many tons. Recently one foundry produced to a customer's specification a set of fender dies, weighing almost 20 tons, of 1.50-1.75 per cent nickel and 0.40-0.60 per cent chromium iron.

$ $ $

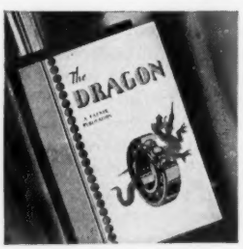
Part of the ejecting mechanism of an automatic can-forming machine consists of an annular steel ring to which eight steel pins are force fitted. These pins eject cans at the rate of 250 per minute, and even slight wear on the ends of the pins causes damage to the cans and seriously interferes with the sequence of operations. For this reason, hardened tool steel pins had to be replaced every six days. Tips of the pins of one ejector unit were hard faced with stellite and after 60 days of continuous operation showed no measurable sign of wear.

$ $ $

An English steel manufacturer is producing a special alloy steel for case hardening applications involving especially heavy duty where high core strength and toughness is essential. This steel, which has proved ideal in gears for heavy motor trucks, contains 0.10-0.20 carbon, 4.00-4.50 nickel, 1.25-1.50 chromium, and 0.15-0.30 per cent molybdenum. Average mechanical properties in the core are said to be as follows: Ultimate tensile strength, 200,000 pounds per square inch; yield point, 165,000 pounds per square inch; elongation in 2 inches, 15 per cent; reduction of area, 47.2 per cent; Izod impact, 26 foot-pounds; brinell hardness, 418.



Let's roll on to Profits in 1934



SAVINGS *through successful fighting of friction, in machines of all kinds on land and sea and in the air, are recorded in* "THE DRAGON". *We will gladly put your name on its mailing list. There's no obligation.*

Waste is the enemy that 1934 will strive to conquer with increasing effort. In the form of friction it is one of industry's serious expenses, a handicap to sales and profits.

There's one attack which never fails —ball bearings. Machinery builders are marshalling these fighters of friction in ever-increasing quantities—and winning. To this success Fafnir is constantly contributing technical improvements in seals, housing and mountings.

In their efficient application the Fafnir engineering staff is at industry's command. Let Fafnir help you roll on to greater profits in 1934! THE FAFNIR BEARING COMPANY, *New Britain, Conn.* Atlanta . . Chicago . . Cleveland . . Dallas . . Detroit . . Milwaukee . . Minneapolis . . New York . . Philadelphia.

FAFNIR BALL BEARINGS

The Plastic Forming Of Metals

By PROFESSOR DR.-ING. ERICH SIEBEL
Translated by JOHN H. HITCHCOCK

Part II—Forces and Flow of Material in Technical Forming Processes

6. Force Required for Extrusion*

MATERIAL in extrusion is not drawn through the zone of deformation formed by the tool, but is pressed through and thereby is deformed by the resulting reaction forces. In this case, also, a condition for the force requirement can be established, in which the external work of forming performed by the compressing tool is equated to the work of deformation calculated according to equation (24). The compressive force, P, which is required to carry out the deformation, is given, according to equation (26), as the product of the final area of cross section, F_o, of the deformed body, the greatest principal deformation, ϕ_h, and the deformation resistance, K_f. With knowledge of the initial and final dimensions of the bar, as well as deformation resistance at the temperature at which the forming process is carried out, and with knowledge of other relations, the resulting compressive force can be calculated.

During extrusion, a billet of length, l_o, and of cross-sectional area, F_o, is transformed into the shape of the extruded bar, having length, l_1, and cross-sectional area, F_1. With circular initial and final cross sections, all ring-shaped body elements, according to Fig. 83, undergo equal elongation:

$$\phi_l = \log_e \frac{l_1}{l_o} = \log_e \frac{F_o}{F_1}$$

in the longitudinal direction, and equal reduction of thickness:

$$\phi_r = \phi_t = \log_e \frac{2\pi x_1}{2\pi x_o} = \log_e \frac{r_1}{r_o}$$

in the radial and tangential directions. Since the volume of the body is unaltered by the deformation, the sum of the deformations in the three principal directions is equal to zero, and the deformation in the radial and tangential directions is only half as great as that in the longitudinal direction. The elongation, therefore, as the greatest absolute principal deformation is designated as the determining deformation for the calculation of the work of deformation, so that for the extrusion process the relation is valid:

$$\phi_h = \log_e \frac{l_1}{l_o} = \log_e \frac{F_o}{F_1}$$

If the similarity of cross section between billet and delivered bar is not retained in the extrusion of certain shapes, as it is in circular cross sections, additional deformations are involved which are difficult to express mathematically. If the principal deformation in this case is designated as elongation, the additional deformations must result in an increase of the deformation resistance.

Details Are Cited

In addition to the direct extrusion process, the so-called indirect or reversed extrusion process has been developed in the last few years. Both processes are represented diagrammatically in Fig. 84. In direct extrusion, the billet lying in the container is compressed by the advancing ram, toward the outlet or die which is placed on the opposite side. A true deformation zone is formed only directly in front of the die, in the region indicated by section lines. If the movement of material prescribed by

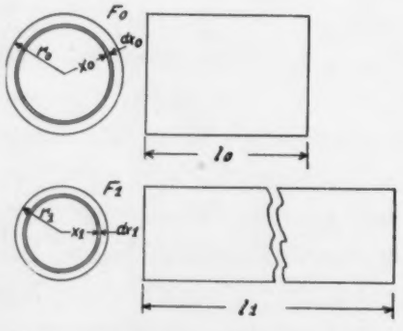


Fig. 83—Relations of deformation in extrusion

a non-uniform temperature distribution be excluded, the parts of the billet, which lie further back are subjected only to displacement as a whole with respect to the walls of the chamber. If the frictional resistance on each unit of area of the chamber wall is set equal to $\mu \times k_f = \mu' \times K_f$, the frictional force resulting from the displacement is given as $R = U \times l \times \mu \times K_f$, where $U = \pi \times d_o$ is designated as the circumference of the wall, and l represents the length of the billet at any instant from the ram to the beginning of the true forming zone. Because these frictional forces are related to the deforming forces according to equation (26), the force P′ exerted upon the ram in direct extrusion is given as:

$$P' = P + R = F_o \times K_f \times \log_e \frac{F_o}{F_1} + U \times l \times \mu' \times K_f \quad \ldots\ldots (46)$$

The first term of the expression for the compressive force is independent of the length of the billet, as long as the forming zone remains unaffected by the advancing ram. The second term, however, is determined directly by the length of billet. Because the part of the billet in the chamber becomes shortened during the extrusion process, the friction decreases to a corresponding extent; and the compressive force must have its maximum value at the beginning of compression in direct extrusion, and must decrease as the process of extrusion continues.

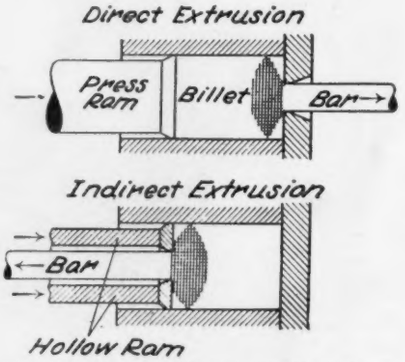


Fig. 84—Diagrammatic representation of extrusion processes

The described frictional losses do not exist in the case of indirect extrusion. The die in this case is placed in the ram itself, which is made hollow. The chamber is closed at the side opposite the ram. Because of these facts, no displacement of the billet occurs along wall of the chamber. The compressed material instead remains completely at rest, with the exception of the part which lies in the zone of deformation. This zone is formed directly ahead of the die, and moves gradually with the advancing ram toward the foot of the chamber. In this case the com-

*Developed according to E. Siebel and E. Fangmeier[107].

ADVERTISING PAGES REMOVED

pressive force during the entire extrusion process remains unchanged from the value given by equation (26), and the result obtained is:

$$P' = P = F_o \times K_f \times \log_e \frac{F_o}{F_1} \ldots\ldots (47).$$

The indirect extrusion process must require a smaller compressive force, differing by the frictional force, R, than the direct extrusion process, and must permit a more favorable utilization of the pressing equipment.

Experimental bases for the requirement of force in extrusion exist at present only in a limited region. An illustration from P. H. Schweissguth[67], reproduced in Fig. 87, of the variation of pressure in a pressure cylinder during direct extrusion, shows clearly a diminution of pressure in the course of the extrusion process, as the part of the billet

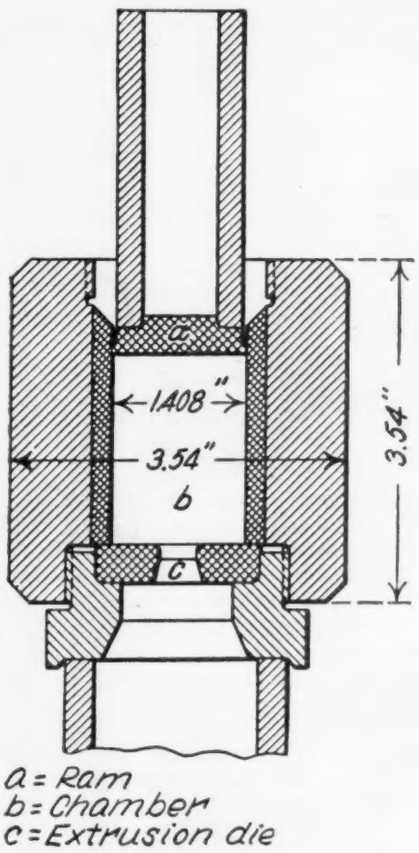


Fig. 85—Equipment for extrusion tests

which remains in the chamber becomes shorter. In direct extrusion tests conducted by H. Unkel[68], with wax billets in a chamber 6 inches diameter and with various sorts of

[67] P. H. Schweissguth: Der Vorgang des Fliessens im gepressten Messingblock beim hydraulischen Spritzen von Stangen; Z. V. d. I. 62 (1918)p.281.

[68] H. Unkel: Uber die Fliessbewegung in plastischem Material; J. Springer Berlin 1928; —Einiges uber die Fliessbewegung beim Pressen von Stangen und Rohren sowie beim Ziehen; Z. Metallk. 20(1928)p.323.

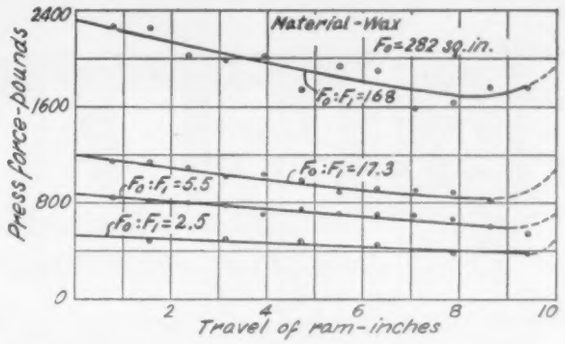


Fig. 86 — Variation of force in direct extrusion (according to Unkel)

dies, a variation of force like that shown in Fig. 86 was observed. In this case also, the diminution of pressure with advancement of the ram is clearly shown. If the deformation resistance of the material is calculated according to equation (46) and (47), from the minimum value of force on the ram, measured near the end of the pressing stroke, this quantity accordingly is given for the various diameters of die as 10 to 11.4 pounds per square inch.

Cooling Results Vary

These few tests are supplemented by further small scale tests, and the indirect extrusion process in the experimental program. With hot brass or aluminum billets, the cooling relations in small scale tests do not correspond to the relations obtained in practice. On the other hand, wax and plasticene, which were used by Unkel for his tests, appear to be poorly suited to the desired purpose, because their properties are too nonuniform and differ too widely from those of metallic substances. Tests therefore were carried out with lead. Inasmuch as this material recrystallizes rapidly even at room temperature, it is in a condition similar to that of other metallic substances during hot-forming.

Test specimens were prepared in the following manner. First an oversize lead billet was cast without a pipe, by a special process. This billet then was extruded into a bar of the thickness required for the test specimens. From such a bar, 12 test specimens of 1.57 inches long were cut. In order to be certain of removing completely the flow-hardening of the material produced by the previous extrusion, these test billets were heated for a period of one hour in a water bath at 112 degrees Fahr. The tests themselves were carried out with the temperature of the test specimens and of the apparatus at 68 degrees Fahr. Extraordinary uniformity of the test material was obtained. The deformation strength of lead, with a deformation velocity of 0.2 per cent per second, was determined in compression tests as 2840 to 4270 pounds per square inch.

The test arrangement is shown in Fig. 85. It consisted of a thick-walled cylindrical chamber of 1.405 inch inside diameter, corresponding to a cross sectional area of 1.55 square inch to one end of which the die plate was firmly screwed. The ram, which was provided with a smoothly polished face plate, and which was held in the proper position by a cylindrical guide, acted at the other end of the chamber. When this was required to be operated by the indirect process, the lower end of the chamber was closed with a solid plate, and the pressing was done with a face plate having an outlet die, by means of which the extruded bar could escape through the hollow ram. The circular-shaped extrusion dies had inside diameters of

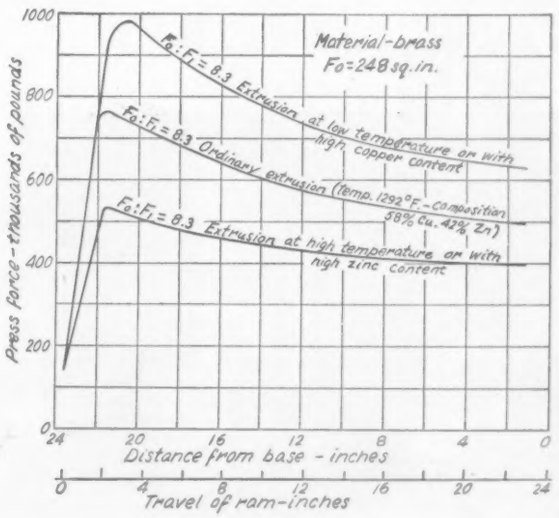


Fig. 87 — Variation of force in direct extrusion of brass billets (according to Schweissguth)

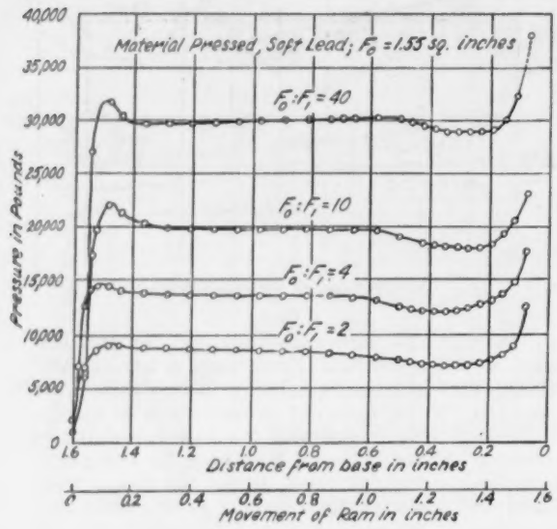


Fig. 88 — Influence of area ratio on variation of force in direct extrusion

0.95, 0.70, 0.409, and 0.224-inch, corresponding to cross sectional areas of 0.775, 0.387, 0.155, and 0.039 square inch. They were ground smoothly and ordinarily had a rounding of 0.04 inch radius on the forward side. Round billets of 1.397 inches diameter and about 1.57 inches long were compressed. For the production of force, a 66,100 pound universal testing machine of the Losenhausenwerk A. G. served, with a shaft drive which permitted the pressing speed to be controlled exactly. The tests were conducted with the same speed of movement of the ram of about 0.197 feet per minute. The movement of the ram could be read on a vernier scale during the course of the test. Observations of force were obtained by the hydraulic cylinder and the manometer of the testing machine.

The results of the direct extrusion tests with various area ratios are set forth in Fig. 88. The wall of the chamber in this test was ground smoothly; the curves, therefore, do not indicate the influence of wall friction, and are nearly horizontal.

The increase of pressure at the beginning of extrusion is attributed to the property of lead by means of which a deformation is opposed at first by an increased resistance, which diminishes with advancing deformation. The pressure drop as the ram approaches the base seems to be explained by the fact that the nature of deformation is altered fundamentally from this point onward. Although the true extrusion process goes forward in such a way that all parts of the original billet travel in the delivered bar, where each part takes a position corresponding to its initial condition; in extrusion of the "tail-slug" or rear end of the billet, only the inner parts still flow in the delivered bar, and the deformation of the outer edge zones decreases to the amount corresponding to direct compression between the die plate and ram.

Sharp Increase Occurs

Toward the end of the extrusion process, when the length of the billet is reduced to less than one-fifth of the width of the chamber, the forces again increase sharply; because a greater frictional effect makes itself felt in this stage, as a result of the decreased thickness of the layer of material which lies between the ram and the base. During this last period of deformation, the tail slug is compressed between the face plate and the die plate. The displaced material escapes toward the middle, so that a hollow cross section is formed in the die. Fig. 89 shows axial sections through the tail slugs, and indicates the shape of the hollow spaces.

(To be Continued)

Gage Block Exhibit Goes To New York Museum

For the next month the New York Museum of Science and Industry, 220 East Forty-second street, New York, will display under the sponsorship of C. E. Johansson Inc., division of Ford Motor Co., Dearborn, Mich., the exhibit of measuring gages shown at the Century of Progress exposition in Chicago last summer.

Accuracy reached by these gages is 2 millionths of an inch. When 76 small gage blocks are placed side by side between parallel jaws alongside a 4-inch gage block, these small blocks together measure only 11 millionths of an inch more than the standard block. Operating exhibits will demonstrate the change in size produced by small variations in temperature and the great adhesion of such blocks face to face.

Second Volume on Roll Pass Design Is Published

In the book review, on page 32 of last week's issue, of Vol. II of "Roll Pass Design" by W. Trinks, the price quoted was in error. The correct price is $6.00, plus 15 cents postage.

Vol. II has just been published by the Penton Publishing Co. It contains 246 pages, with 21 tables, seven charts and 176 illustrations. It can be supplied by STEEL, 1213 West Third street, Cleveland, O.; in Europe by Penton Publishing Co., Ltd., Caxton House, Westminster, London.

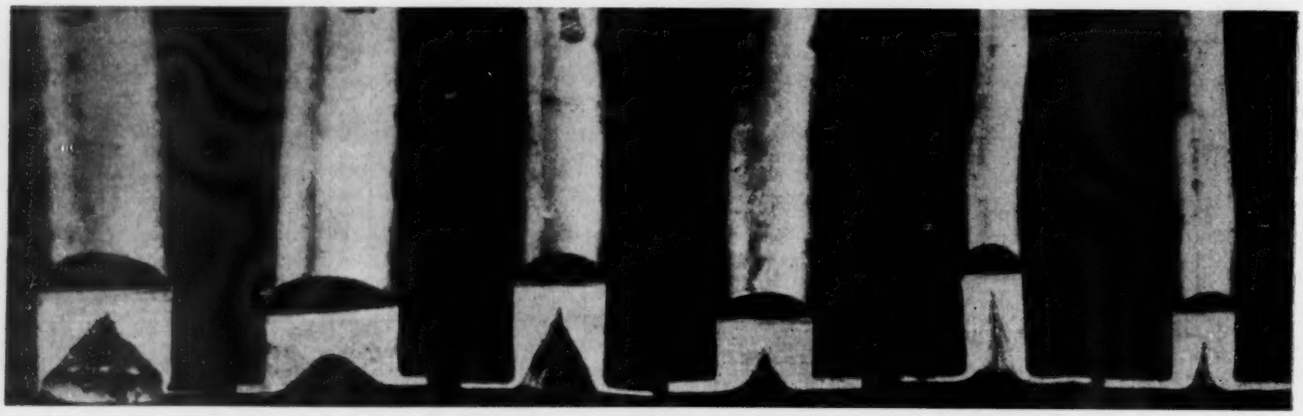


Fig. 89—Sections through tail slugs

REX CHAIN

FOR EVERY DRIVE & CONVEYOR

FOR EVERY INDUSTRIAL USE . . .

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ROLLER CHAIN

The most highly finished chain on the market today for long service and low cost on high speed drives.

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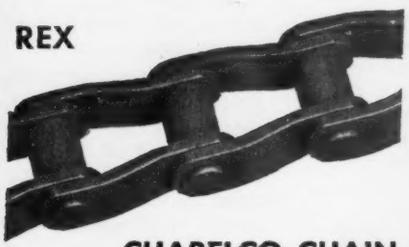

CHABELCO CHAIN

A strong, long-wearing chain. Built with the famous Unit Link. For heavy duty drives at somewhat slower speeds—also in conveyor sizes.

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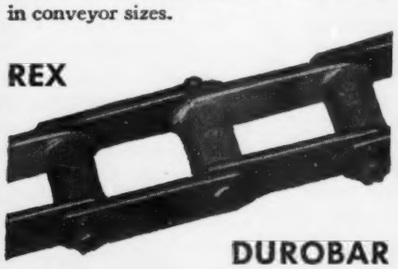

DUROBAR

An improved combination chain—the block link of either malleable or Rex Z-Metal—the latter the strongest, most wear-resisting metal cast in chain.

REX

GRIPLOCK

In malleable. The Griplock joint makes it a stronger chain—size for size and link for link—also cast in Z-Metal for longer, harder wear.

REX

UNICAST

The one-piece link—roller cast in place—makes it the most efficient malleable chain ever offered for eccentric loading on double strand conveyors.

REX

SNAKE CHAIN

A malleable chain that can flex in short radii in any direction—will help on many conveyor problems.

OTHER REX CHAINS

The Chain Belt Company also makes many other chains in malleable, Z-Metal, Steel and Combination for every type of service—and sprockets of all types—take-ups—set collars—buckets. Write on the type that interests you.

CHAIN BELT COMPANY
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SCANNING THE FIELD OF TECHNOLOGY

A Digest of Important Developments Pertaining to the Production, Processing, Application and Performance of Steel

Columbium

By Frederick M. Becket and Russell Franks, Union Carbide & Carbon Research Laboratories, in a paper to be presented at the forthcoming meeting of the American Institute of Mining and Metallurgical Engineers, published in Metals Technology (new semiquarterly issued by the institute), January, 14 pp., 7 ills., 5 tables.

A record of some of the results obtained through the introduction of columbium to the austenitic chrome-nickel steels. Columbium has been shown to be a particularly valuable inhibitor of intergranular corrosion in steels of the 18-8 chrome-nickel type. The authors state that the enhancement of corrosion resistance through introduction of columbium does not require sacrifice of the present valuable properties of these steels.

—STEEL, 2-5-34

Annealing

By M. W. Brewster, in Machinery, January, p. 265, 3 pp., 2 ills., 2 tables.

How cost of formed parts has been reduced by annealing steel blanks in a controlled atmosphere. Blanking operation caused work hardening and subsequent rejections in forming operation when annealed strip steel, 0.06-0.08 per cent carbon, was used. Practice was changed and unannealed strip used with controlled atmosphere annealing equipment provided after blanking. Operated at the rated capacity of the annealing furnace—300 pounds per hour—the equipment would have been paid for in six months.

—STEEL, 2-5-34

Hydraulic Controls

By Harold B. Veith, in Machine Design, December, p. 11, 4 pp., 5 ills.

Description of a machine developed to drill and ream three holes simultaneously in the three bosses of a V-type internal combustion engine cylinder block, and then insert an oil distributing tube. Use of hydraulic operation provides simplicity in design, cushioning effects, flexibility and ease of control.

—STEEL, 2-5-34

Steel Selection

By H. W. McQuaid, Republic Steel Corp., in Blast Furnace and Steel Plant, January, p. 63, 5 pp., 2 ills.

The author discusses the difficult problem of selecting alloy steels. Desirable characteristics of a given steel in a finished part may be divided into three types: Resistance to surface wear; ability to withstand stresses met in service; and ability to produce the finished part having satisfactory properties in the most economical manner. Effects of carbon and various alloying elements upon steels are discussed. Important factors to be considered in determining the composition of an alloy steel are enumerated.

—STEEL, 2-5-34

Alloy Castings

By J. H. Critchett, in The Foundry, January, p. 16, 4 pp., 1 ill., 1 chart, 5 tables.

General discussion of physical properties, corrosion resistance and applications of a wide variety of plain chromium alloy steel castings. The first part of the article deals with castings containing 1 to 3 per cent chromium, used for structural parts; the second covers a chromium content of from 4 to 7 per cent, used where both structural and certain corrosion requirements must be met; the third mentions cursorily special high-chromium corrosion-resistant steel castings.

—STEEL, 2-5-34

Coolants

Booklet published by Socony-Vacuum Corp., New York, 40 pp., line drawings, chart insert.

This handy treatise discusses lubricants and coolants for metal cutting. Fundamentals of cutting are outlined, followed by detailed comment on the various cutting operations, including, grinding, cold sawing, shaping and planing, turning and boring, drilling and reaming; milling and hobbing, threading and tapping, and broaching. Properties of the various commoner metals are reviewed and a chart attached, tabulating recommended coolants for specific purposes.

—STEEL, 2-5-34

Ferroalloys

By C. H. Herty Jr., in Blast Furnace and Steel Plant, January, p. 68, 3 pp.

In open-hearth practice, ferroalloys are added to liquid steel for one or more of five purposes. In brief, these are: To make an alloying addition to the steel; to deoxidize the bath; to insure correct chemical analysis of the heat, in other words, killing the heat; to "shape up" the slag and allow the temperature of the metal to be adjusted by a "reboil," a common practice in making rimming steel; and lastly, to attain some goal other than chemical analysis or tensile property, such as hardenability, grain size, freedom from aging and the like.

—STEEL, 2-5-34

Grinding Springs

Abrasive Industry, February, p. 10, 2 pp., 2 ills.

Details of how coil springs for automobile independent wheel suspension units are ground. Wire for the springs ranges from 5/8 to 3/4 inch in diameter and is centerless ground before coiling, to obtain required roundness and finish. After coiling and heat treatment the springs are ground on both ends to insure a good bearing surface. Equipment for the latter operation is described.

—STEEL, 2-5-34

Antifriction Bearings

Pamphlet published by the Fafnir Bearing Co., New Britain, Conn., 8 pp., 7 ills.; copies available upon request.

"An Outline of History for Anti-Friction Bearings," is the title of this interesting work which follows the development of ball and roller bearings from the building of the pyramids to their present state of refinement. Railroads, bicycles and automobiles have contributed in large measure to the broad market which these bearings now enjoy.

—STEEL, 2-5-34

Cutting Tools

By J. V. Emmons, in Metal Progress, December, p. 35, 6 pp., 2 ills.

Survey of materials for modern cutting tools, indicating that plain carbon tool steel is still pre-eminent for cutting nonabrasive materials where the service does not heat the tools. Deeper and faster cutting calls for high-speed steels. Abrasive objects require diamonds or cemented carbides. Certain of the nonferrous alloys also are useful as tool materials.

—STEEL, 2-5-34

Welding in Breweries

By D. S. Lloyd, in Journal of the American Welding Society, January, p. 24, 6 pp., 8 ills., 2 tables; a paper presented at the fall meeting of the society.

Most important field for the adoption of welding in breweries is piping, much of which is steel. Many other applications are evident, however, such as in the maintenance of brewing, distribution and service equipment.

—STEEL, 2-5-34

ADVERTISING PAGES REMOVED

PROGRESS IN STEELMAKING

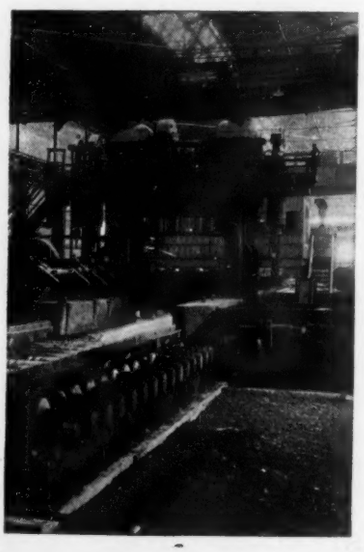
EXPERIMENTAL work now is being done in this country on molybdenum iron ingot molds for casting steel. In Germany the life of the ingot mold has been increased 50 per cent merely by using 0.30 per cent molybdenum in the mold iron.

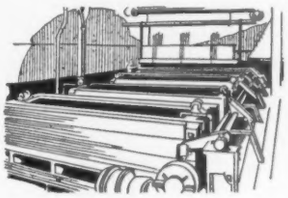
• • •

Side skulls in open-hearth ladles seldom occur when insulation is used in the lining according to tests conducted at an Ohio open-hearth shop. Insulating ladles also provides an increase in their holding capacity.

• • •

Preventing blast furnace gas from flowing back through the cold blast main to the blowing engines when the mixer valve is in an opened position is the purpose of a newly developed drop valve. The bell-shaped mixer valve is built with a hollow stem provided with vent holes at the top. These holes afford a reduction in the pressure to atmospheric on the upper side of the drop valve so that the pressure of the cold blast on the lower side of the drop valve will keep this seated tightly against the mixer valve seat as long as the pressure in the mixer line is not less than ½ pound. Should the pressure be reduced below ½-pound, the drop valve will fall instantly to its lower seat, closing off the mixer line. The hot blast side of the mixer line is vented at the same time through the hollow stem of the mixer valve. Any gas coming from the stack through the hot blast main thus will be bypassed through the vent holes at the top of the mixer valve stem.





SPEED of pickling steel sheets, strip, wire, pipe, etc., is retarded to a large extent by the presence of arsenic in the bath, according to tests. Even a trace of this element will prolong the time of pickling.

• • •

Protecting the surface of sheet bars and other steel commodities against oxidation during shipment, is the purpose of a recently developed coating solution. The liquid is made by dissolving pickling rosin in a solvent in the proportion of 35 and 65 per cent respectively. Application is made by brushing or spraying. The coating, which dries within 15 minutes, is removed by immersing for a period of about 2 minutes in an ordinary 7 per cent pickling solution maintained at a temperature of 180 degrees Fahr.

The coating is dissociated by the action of the acid and in no way changes the character of the pickling solution. A maker of semifinished material in the Pittsburgh district has been employing this solution for many weeks for coating sheet bars which are to be converted into high-finished sheets by the loose-rolling process.

• • •

Socketing wire rope for various applications at blast furnaces and steel plants now can be accomplished in a safe, simple and easy manner by the use of a recently marketed unit comprising a socket, sleeve and plug. The latter are attached without the necessity for flame or molten metal.

• • •

Lubricating the roll necks of hot and cold sheet and tin mills now is consumated without interfering with the mechanism of automatic roll polishers by the installation of new electrical device. The unit consists of an adjustable narrow steel box or cradle which is mounted in the housing window above the roll necks and over their entire length. A block of neck grease rests on a heater element, its flow being regulated by controlling the current in the electric heating coil by a rheostat. Each stand of rolls requires four cradles and two rheostats. A saving in the quantity of grease used amounts to 25 per cent or more, contingent upon the production and rolling practice. Swabbing pots no longer are necessary. Rejections caused by grease splashing on the surface are greatly reduced.

Mirrors of Motordom

(*Concluded from Page* 19)

suffers no deterioration out of doors over the winter.

But in full-finished sheets, aside from "sweating" difficulties arising from changes in temperature, a change in grain structure has set in by their being stocked in piles horizontally. Because they weren't hung vertically, many of these full-finished sheets in stock have developed a further 6 to 8 Rockwell hardness which is going to set the stage for breakage or other troubles in the press.

Though it was late January, about ten days ago some fourth quarter sheet steel was still coming into Detroit. A leading body plant, its own storage facilities brimming with sheets, had several cars of full-finished material on track and was anxiously seeking a resting place to escape further demurrage.

Hupmobile is planning to make 9000 models during the first half . . . . Tool and die work for the new Buick, which will be a small companion car, is proceeding rapidly . . . . Some of the new knee-action wheels are designed to spring 4½ inches either way from center, making a 9-inch variation . . . . Speaking of springs, a Detroit bumper manufacturer wondered at repeated complaints on breakage recently. The steel was traced back and all complaints arose from a single carload of what was supposed to be S. A. E. 1095 steel, high carbon spring stock. Tests showed a 60-point carbon error. The steel was actually ordinary soft bar stock, S. A. E. 1035 . . . . One of the new 1934 cars places a seal on its motor making it impossible to drive over 40 miles an hour for the first 1000 miles . . . . Chevrolet's commercial car division, having sold 103,000 units in 1933, worked off a heavy January schedule, the original plan having been to make 25,000 in the month.

Men of Industry

(*Concluded from Page* 21)

president to succeed his brother, the late George Vits. H. L. Vits, vice-president and general superintendent, has been elected to the board of directors.

□ □ □

Arthur E. Allen has been elected a vice president of Westinghouse Electric & Mfg. Co. East Pittsburgh, Pa., in charge of the merchandising division. He will have charge of all sales,

E. E. Goodwillie

Who as announced in STEEL for Jan. 15 has been appointed assistant to the vice president in charge of sales for the Bethlehem Steel Co., Bethlehem, Pa.

manufacturing and engineering activities of this division.

□ □ □

F. J. Sikorovsky was re-elected president and treasurer of the Ampco Twist Drill Co., Jackson, Mich., at the annual directors' meeting of the company, Jan. 25. Other officers re-elected were: E. R. Young, vice president; and C. L. Jacobs, secretary.

□ □ □

G. G. McDonald, during the past 15 years sales representative in the southern states for the Lake Erie Bolt & Nut Co., Bourne-Fuller Co., and until recently for the Republic Steel Corp., has been named general manager of sales for the Texas Nail & Wire Mfg. Co., Galveston, Tex.

A. S. T. M. Issues Its 1933 Index of Standards

American Society for Testing Materials has issued its "1933 Index to A.S.T.M. Standards and Tentative Standards." This index is designed to be of service in locating specifications and test methods in the publications in which they appear.

With the number of society standards and tentative standards now totaling 689, this index also is helpful to purchasing agents, materials engineers and others in determining whether the A.S.T.M. has issued standards on a specific subject.

The 1933 index, containing 124 pages, has been revised completely and, while the method of indexing is essentially the same, the subject matter has been rearranged to enable references to be located more quickly than heretofore. Copies may be obtained without charge by addressing the society headquarters, 260 Broad street, Philadelphia.

Named Campbell Lecturer For Metal Congress

Harry W. McQuaid, who recently joined the metallurgical staff of the Republic Steel Corp., Youngstown, O., has been selected as the 1935 Campbell Memorial lecturer of the American Society for Metals, formerly American Society for Steel Treating. Mr. McQuaid is internationally known as an authority on carburizing steels and case hardening methods. He was a pioneer in grain size control and collaborated in the development of the McQuaid-Ehn test.

Dr. V. N. Krivobok, Carnegie Institute of Technology, Pittsburgh, will deliver the Campbell lecture at the society's 1934 metal congress in New York, Oct. 1-5.

Publishes New Information On Roller Bearings

A new 266-page loose-leaf book containing general information on its various types of tapered roller bearings has just been released by the Timken Roller Bearing Co., Canton, O. It differs materially from previous editions since new load ratings have been established conforming to the fatigue life of the bearings.

An explanation of the ratings along with methods for calculating loads and selecting bearings comprises one section of the book. This is followed by a statistical presentation of all available types of bearings; tables having been arranged uniformly by cone bores with the smallest bores shown first.

The next two hundred odd pages comprise the dimension sheet section. Illustrations in this division are to scale and accurate to 0.01 inch; this will permit draftsmen to use them to trace the bearing in the proper position on drawings either in full or half size, since both sizes are given.

In the application of bearings, certain miscellaneous parts frequently are needed and the section immediately following the dimension sheets covers shims, nuts, tubes, washers, cotter pins and several types of closures.

Success of a bearing application depends not only upon selection of the proper type but also upon the observance of certain basic principles. These are covered thoroughly in the section on mounting. Shaft and housing design, typical mountings of single, double and quadruple assemblies, closures, fitting tolerances for both cups and cones, assembly methods, data on lubrication and a description of the company's wear and lubricant tester conclude the book.

LIGHT *crates for* **HEAVY** *loads*

No. 67
Pickling Equipment that passes the test of service

Tin mill type of pickling crate constructed entirely of rolled Monel Metal by YOUNGSTOWN WELDING & ENGINEERING CO., Youngstown, Ohio. These crates, designed for individual capacity of 3,500 lbs. cold rolled steel plate, weigh approximately 1,365 lbs. each. They are used in 3 to 5% solution of sulphuric acid at 185° F.

112 Spacer Bars no problem in this tin mill pickling crate . . . it's ROLLED MONEL METAL

● Look at the crate shown above. Slender as these bars may be, don't think that acid will soon eat them up.

Remember, *this* crate is built of rolled Monel Metal.

Strength and chemical stability

It's not necessary to make a pickling crate so heavy that each load is practically all crate and no product! Make it of rolled Monel Metal.

Monel Metal resists corrosion so stubbornly that there's no need to build in excessive thickness for the pickling bath to eat away.

Neither is excessive thickness needed to carry heavy loads. Light bars of this steel-strong high Nickel alloy are more than adequate.

Furthermore, Monel Metal's resistance to corrosion is about your surest guarantee that the bath will clean your product thoroughly.

Thorough Cleaning — No Plating

The cleaning action is not impeded, either chemically or electrolytically, by Monel Metal. The crate won't plate your product.

Monel's resistance to hot sulphuric and cold muriatic acids, *plus* great strength are well known to Youngstown Welding & Engineering Company, which specializes in pickling equipment. Performance records lead that company to urge rolled Monel Metal for all its important installations.

The tin mill type of crate shown above is a "Youngstown" product . . . one of a battery of four recently built for Follansbee Brothers Company, of Follansbee, West Va.

Let us tell you about some of the interesting case-histories of Monel's performance . . . both in pickling crates and tank tie-rods . . . under the severest pickling room conditions. Just drop us a line.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

• • •

Monel Metal is a registered trade-mark applied to an alloy containing approximately two-thirds nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed by International Nickel.

MONEL METAL

MONEL METAL

NEW EQUIPMENT

PRODUCTION FABRICATION
TREATMENT FINISHING

Vertical Turret Lathe—Bullard Co., Bridgeport, Conn., recently introduced a new vertical turret lathe in 56, 66, 76 and 86-inch sizes. The unit employs an hydraulically-operated speed shift mechanism with a visible indicator dial. Cross sections of the base walls are of sufficient thickness to assure elimination of vibration and to give a rigid and firm support for cross-rail, main heads and side heads. The cross-rail, which is provided with raising screws driven by an individual motor for raising and lowering, will accommodate two heads. Because of the increased scope and added efficiency obtainable by the use of two side heads, this feature has been incorporated in the design.

♦ ♦ ♦

Diesel Locomotives — Fate-Root-Heath Co., Plymouth, O., recently brought out two new diesel locomotives, 8 and 12-ton types respectively, equipped with Caterpillar diesel engines. A feature is the one-piece frame fabricated of steel plates. Four speeds forward and four speeds reverse are provided. The units also utilize semi-elliptic cross equalized spring suspension.

♦ ♦ ♦

Valve Operator — Philadelphia Gear Works, Philadelphia, has redesigned its electric valve operating mechanism. The control consists of a self-contained reducing gear unit with mechanical and electrical limit built into the mechanism. Valve operating nut that raises and lowers the valve disk is incorporated in the casing. The unit is adaptable to every form of gate and globe valve, sluice gates, dampers, heavy factory doors, monitor sash operation and for any mechanism having a definite movement that must be stopped or reversed at the end of travel.

♦ ♦ ♦

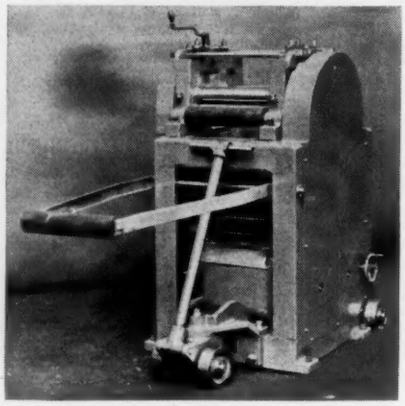
Rotary Shear—Williams, White & Co., Moline, Ill., recently introduced a rotary shearing machine which will cut straight lines, circles and irregular curves in ¾-inch mild steel plate to the center of a 96-inch circle. Cutters are driven from motor mounted overhead. The head is moved downward and held by an hydraulic cylinder, pressure for which is supplied by a rotary pump. Three speeds of cutting travel are provided and overload is prevented when material that is too thick or too hard is inserted between the cutters.

♦ ♦ ♦

Drilling Machine—Artos Engineering Co., 327 East Brown street, Milwaukee, recently announced drilling equipment consisting of a drillhead suspended from a swinging and adjustable horizontal support made of structural steel. This support is mounted on a runway. The drillhead is carried in a cradle, permitting easy handling of the drill. A clamp is provided for the drillhead to secure the head to the material before the drill penetrates the work. Drilling operation is entirely automatic.

♦ ♦ ♦

Roll Feeding Straightener—Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., has developed a large size portable roll feeding straightener, shown herewith. Purpose of the machine is to straighten coiled stock and deliver it to a power press. A mechanical feed adjustment is provided which



may be set to deliver any specified amount of material to accommodate the feed of the press. An automatic electrical control prevents the straightener from feeding when the press is shut down. The company also is building a machine for producing flat blanks from coiled stock. It consists of a coil holder, a straightener for flattening the stock, and a special horizontal press equipped with compound tools. The unit is intended for blanking such work as condenser plates, clock plates and gears, typewriter parts, etc.

♦ ♦ ♦

Die Head—Geometric Tool Co., New Haven, Conn., has introduced a combination die head that will take either circular or tangent chasers interchangeably. Chasers, holders and all, can be extracted from the head without its removal from the machine, ground and set and replaced in a minimum of time. The chasers also can be taken from the holders and ground accurately in a new fixture which is adapted for use on any universal surface grinding machine.

♦ ♦ ♦

Gas Cutting Machine—America Oxycop Co., Niagara Falls, N. Y., i introducing a new gas cutting machine. Its cutting capacity is 24 x 18 x 18 inches. Equipment inclu an electric tracing head, varia speed drive, and a speed indicato to determine the correct speed fo cutting different thicknesses of met Three special devices can be attac to the tracing head, enabling the c erator to use a blueprint, wood tem plate or metal template.

♦ ♦ ♦

Wheel Dressers—Graham Mfg. Co., Providence, R. I., is manufac turing two styles of grinding wh dresser holders for application on standard and special grinding machines. These units have two types of bases, one a long type and the other square. Both are arranged with slotted holes for bolts by which they are attached to the table or other suitable place on the grinding machine.

♦ ♦ ♦

Vertical Compressors — Gardner-Denver Co., Quincy, Ill., recently designed a new line of vertical air compressors. Inlet and discharge valves are cushioned. Extra large water jackets completely surround the cylinders and valves, assuring minimum cylinder temperatures. A water-cooled intercooler is claimed to save power and increase volumetric efficiency by cooling air between stages.

♦ ♦ ♦

Treadless Switch—Tiffin Electro-Mechanical Co., Wall and Hudson streets, Tiffin, O., has developed a magnetically operated treadless road switch which, when placed in the path of an auto, truck, tractor or other vehicle built of iron or steel, will operate doors, danger signals, etc. No physical contact is necessary because the operation depends on magnetic influence. The device is designed for floor or road installation.

♦ ♦ ♦

Pyrometer—Foxboro Co., Foxboro, Mass., recently introduced a new indicating pyrometer that employs the potentiometer system of temperature measurement. The pointer of a galvanometer swings just above the temperature dial and is brought to balance at the same hair line index which marks the measurement on the temperature scale. The hair line is part of a glass window through which both the pointer and scale can be viewed at the same time. Because of this feature, bal-

ancing and reading the instrument are practically one operation.

♦ ♦ ♦

Splash-Proof Motors — Marble-Card Electric Co., Gladstone, Mich., has announced a new line of motors designed for protection against falling or splashing water. The units are fully enclosed excepting for small openings on the lower side of each end plate which are so designed that water can not enter the interior. A cooling system makes it possible to use the same frame sizes for splash-proof motors as for open-type units of equal rating.

♦ ♦ ♦

Squeeze Riveter — Norin Engineering Co., 355 North Union Park court, Chicago, has designed a mechanical squeeze riveter with an automatic feeding arrangement. Rivets are fed from a hopper to a pair of receiving fingers, mounted around the upper die which is fastened to the plunger. These fingers hold the rivet in position under the upper die during the down or riveting stroke.

♦ ♦ ♦

Plunger-Type Relays — General Electric Co., Schenectady, N. Y., is introducing a complete line of instantaneous and time-delay plunger-type relays for protection against over-current and under-voltage. The instantaneous over-current relay can be changed from time delay on contact opening, contact closing, or both, by simply placing a poppet in the proper hole. Likewise, by turning a cap, the air intake or out-take to the bellows can be regulated to change the time delay in the opening or closing of the contacts.

♦ ♦ ♦

Electric Arc Welder—USL Battery Corp., Niagara Falls, N. Y., is manufacturing a new arc welder, fully enclosed with an improved cooling system. Two convenient current and voltage controls permit any voltage and current combination desired. A wide welding range of 40 to 550 amperes is a feature of the new equipment. Armatures of the motor, generator and exciter all are mounted on a single heavy-duty shaft, resulting in a more compact design. No resistors are employed. By use of new stabilizing coils the inherent stability of the welder has been increased, it is claimed.

CONFORMING to its established policy of conciseness, STEEL now presents announcements and descriptions of new equipment in brief but comprehensive form. Full particulars concerning any item on this page may be obtained direct from the manufacturer.

♦ ♦ ♦

Gas Bench Furnace—Red Devil Mfg. Co., Bellwood, Ill., recently placed on the market a three-burner gas bench furnace for sheet metal shops, machine shops, metal pattern makers, etc. Three bunsen burners, each with a shutoff valve, are employed. The unit is said to be an efficient, economical auxiliary to larger heat treating furnaces.

♦ ♦ ♦

Fan-Cooled Motor—Electric Machinery Mfg. Co., Minneapolis, is offering a totally-enclosed fan-cooled synchronous motor designed for corrosive locations. Working parts are sealed from outside atmosphere and exterior of motor is treated to prevent corrosion. Cooling is attained by internal recirculation of air. These synchronous units are available in practically any horsepower or speed rating.

♦ ♦ ♦

Spray Finishing Machines—DeVilbiss Co., Toledo, O., has placed on the market new rotary spray finishing machines capable of an approximate production of 1000 to 3600 small, light weight articles such as automobile parts, electrical and radio parts, etc., per hour. Automatic loading and unloading mechanism may be supplied as desired, and can be co-ordinated with a conveyor system. The machines are equipped for either manual or automatic spray gun operation.

♦ ♦ ♦

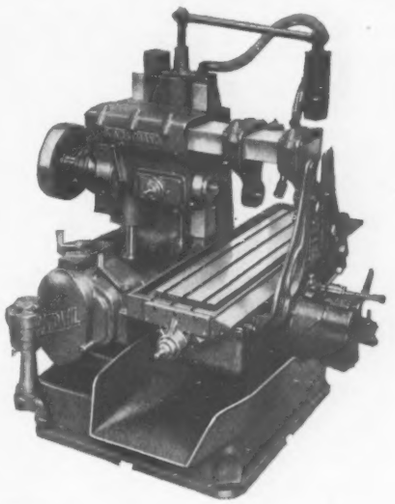
Drill Speeder Unit—Ex-Cell-O Aircraft & Tool Corp., 1200 Oakman boulevard, Detroit, announces the development of a special drill speeder unit for horizontal boring and milling machines, radial drills and similar equipment. With this unit a higher range of speeds can be obtained. Ratio of the device is four to one over the spindle speed of the machine on which it is used. The units are furnished with No. 5 Morse taper drive which enables the user to provide suitable sleeves or adapters to fit his particular make or style of machine.

♦ ♦ ♦

Transformers — Esterline-Angus Co., Indianapolis, is offering new portable current transformers for use with indicating and recording instruments. Each unit has nine primary current ranges. Secondary capacity is 5 amperes; volt-ampere rating is 25, and the transformers are compensated for a load of 15 volt-amperes. This equipment is designed for use in all kinds of portable testing. Containing cases are cast aluminum to withstand rough usage. Each unit is provided with a built-in secondary short-circuiting switch for protection of the operator.

♦ ♦ ♦

Milling Machine—Sundstrand Machine Tool Co., Rockford, Ill., recently placed on the market a new milling machine which is designed with either low, medium or high-speed heads, vertical or horizontal spindles, and reciprocating or rotary tables. Features include electrical control centralized in a pendant which may be swung freely to any position convenient for the operator, new housing for spindle speed pickoff gears which have improved mounting for better operation and easier changing, direct gear reduction motor drive, etc. Applications of this unit, shown herewith, cover a wide field.



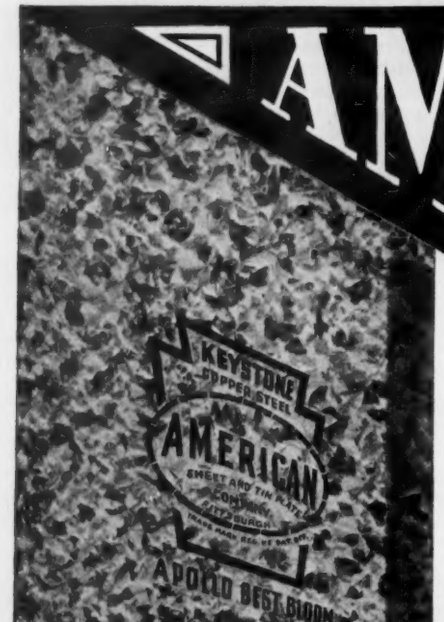
♦ ♦ ♦

Milling Head — Universal High Speed Tool Co., 649 West Washington boulevard, Chicago, is marketing a high-speed universal milling head designed for use as an attachment for milling machines. It is suitable for such operations as routing, engraving, filing, grinding and finishing on molds, dies and metal patterns. The head may be swiveled to any angle and clamped rigidly in position.

♦ ♦ ♦

Circle Shear—Quickwork Co., St. Marys, O., recently designed a mill type circle shear employed to cut circles in all gages of metal up to ⅜-inch mild steel plate. The work is performed with the material traveling 75 feet per minute. Circles can be cut to a maximum diameter of 96 inches from a square plate. The company's patented self-centering principle is embodied in the circle cutting mechanism.

AMERICAN



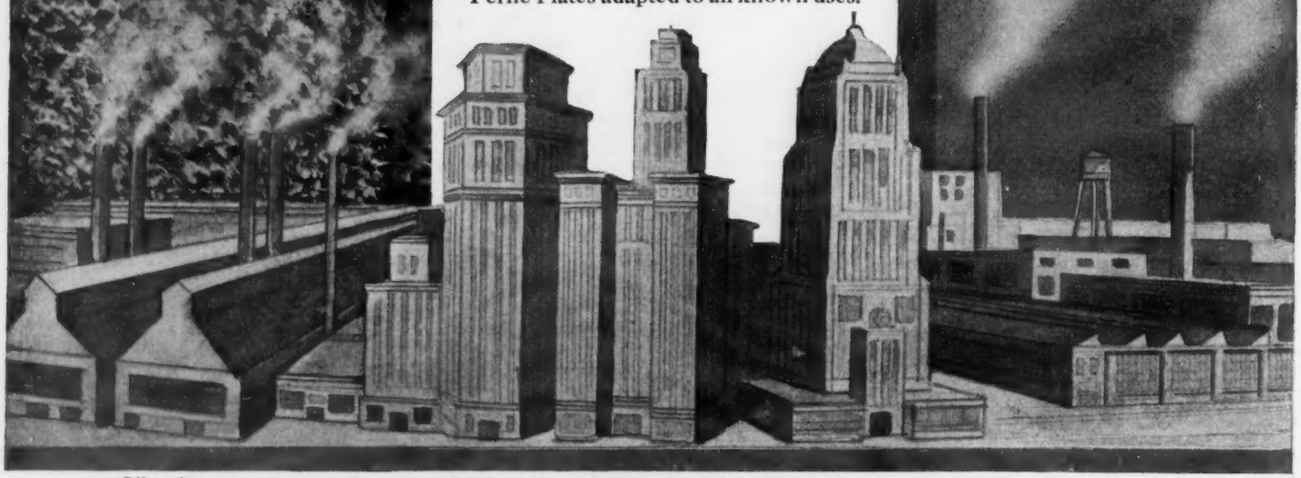
STEEL SHEETS

Black and Galvanized

SPECIAL QUALITIES FOR FORMING AND FABRICATING

AMERICAN Products are high grade and are carefully manufactured in every particular—both mechanically and metallurgically.

Supplied in Black Sheets, Galvanized Sheets, Special Sheets, Keystone Rust Resisting Copper Steel Sheets, Formed Roofing and Siding Products, Tin and Terne Plates adapted to all known uses.



This Company also manufactures U S S Stainless and Heat Resisting Steel Sheets and Light Plates of highest quality

U S STEEL

American Sheet and Tin Plate Company

GENERAL OFFICES: Frick Building, PITTSBURGH, PA.

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

KEYSTONE COPPER STEEL AMERICAN SHEET AND TIN PLATE COMPANY

Write for full information and literature - *District Sales Offices in principal cities*

Freight Car, Automobile Tonnages Increase

Equipment Awards Largest in Several Years—Rail Program To Go Ahead—Steel Rate Resumes Upward Trend—Iron Output Gains

WITH the largest railroad freight car awards in several years, heavier releases by the automobile industry, and improvement in purchasing extending into practically all lines of products, steel demand last week gave evidence of expanding more rapidly than production.

The Van Sweringen lines early this week were expected to make formal announcement of their allocation of 12,775 freight cars and 169 passenger coaches, which shortly will place orders for approximately 175,000 tons of rolled steel on mill books. Unofficial reports noted the distribution of 8275 cars to three companies, while 20 locomotives and 20 extra tenders were placed with two builders.

These and other impending car and rail awards foreshadow an early gain in steelworks operations, the automobile industry last week supplying the chief impetus which lifted the rate 3 points to 36 per cent.

Dispelling doubts concerning the rail program for this year, Washington officials state the steel industry can count upon orders for 845,000 tons of rails and some 200,000 tons of track fastenings, as originally planned, the bulk of this tonnage to be placed between March 1 and June 1. Rail production has been resumed at Chicago.

Iron Output Best for Any January Since 1931; Gain of 12 in Active Stacks

That steelmakers are preparing for a much higher rate of operations is indicated by a net gain of 12 active blast furnaces in January, all at steelworks, 86 operating at the close of the month, since which time three more steelworks stacks have been blown in.

Daily average pig iron production in January was 39,426 gross tons; and the total, 1,222,214 tons, both up 2.5 per cent from December. In both instances, also, output was the largest since October last year, while it was the best record for January since 1931.

Shape awards for the week, 15,024 tons, show little change from the preceding week, public works projects developing slowly. The Pennsylvania railroad has resumed with its electrification program, and this week is expected to begin releasing material on its contracts for 40,000 tons, including 8000 tons for yard poles. Illinois Central is taking bids on 3800 tons for a bridge at Cairo, Ill.; and the government, on 8785 tons of plates, shapes and bars for seven airplane carriers to be built in navy yards.

Scrap Strong; Foundry Operations Improve; Exports Reflect Dollar Devaluation

Scrap is strong, in a waiting market, with a bulge in purchasing anticipated as soon as some of the larger steel orders now pending reach mills. Purchase of 17,000 tons of No. 1 heavy melting steel by the leading interest at Pittsburgh at $13.50 a ton, delivered, has firmed the market there. Improvement in foundry operations is fairly general. Another cargo, 4700 tons, of Royal Dutch iron has arrived at Philadelphia.

Depreciation of the dollar evidently was an important element in American iron and steel exports advancing 17 per cent to 184,585 gross tons in December, largest for any month since May, 1930. Imports rose only 7 per cent to 31,310 tons. For the year 1933 exports increased 126 per cent to 1,350,692 tons, exceeding those for 1932 and 1931. Imports were up 9.3 per cent to 414,790, arresting the yearly declines since 1928.

STEEL's London cablegram states general improvement in Great Britain is substantiated by reopening of iron mines long idle. Trade on the Continent also is more satisfactory. Japanese competition is penetrating into Central Europe.

Steelworks operations last week advanced 33 points to 79 per cent at Detroit; 5 to 69 at Cleveland; 2 to 25½, eastern Pennsylvania; 2 to 34, Buffalo; 1 to 31, Chicago; and 9 to 41, Youngstown. They were down 3 points to 19 per cent at Pittsburgh; 4 to 82, New England; and remained unchanged at 64 at Wheeling; and 52, Birmingham.

STEEL'S price composites are unchanged, with iron and steel $32.43; finished steel $51.10; and scrap $11.54.

COMPOSITE MARKET AVERAGES

	Feb. 3	Jan. 27	One Month Ago Jan., 1934	Three Months Ago Nov., 1933	One Year Ago Feb., 1933	Ten Years Ago Feb., 1924
Iron and Steel Composite	$32.42	$32.42	$32.42	$31.59	$28.31	$43.49
Finished Steel Composite	51.10	51.10	51.10	49.20	45.35	67.48
Steelworks Scrap Composite	11.54	11.54	11.24	9.64	6.33	18.67

Iron and Steel Composite:—Pig iron, billets, slabs, sheet bars, wire rods. tin plate, nails, sheets, plates, shapes, bars, and black pipe. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

	Feb. 3, 1934	Jan. 1934	Nov. 1933	Feb. 1933
Finished Material				
Steel bars, Pittsburgh	1.75	1.75	1.75	1.60
Steel bars, Chicago	1.80	1.80	1.80	1.70
Steel bars, Philadelphia	2.04	2.04	2.04	1.91
Iron bars, Terre Haute, Ind.	1.60	1.60	1.60	1.65
Shapes, Pittsburgh	1.70	1.70	1.70	1.60
Shapes, Philadelphia	1.90	1.90½	1.90½	1.65
Shapes, Chicago	1.75	1.75	1.75	1.70
Tank plates, Pittsburgh	1.70	1.70	1.70	1.60
Tank plates, Philadelphia	1.88	1.88½	1.88½	1.59½
Tank plates, Chicago	1.75	1.75	1.75	1.70
Sheets, No. 10, hot rolled, Pitts.	1.75	1.75	1.75	1.60
Sheets, No. 24, hot ann., Pitts.	2.25	2.25	2.25	2.00
Sheets, No. 24, galvan., Pitts.	2.85	2.85	2.85	2.50
Sheets, No. 10, hot rolled, Gary	1.85	1.85	1.85	1.60
Sheets, No. 24, hot anneal., Gary	2.35	2.35	2.35	2.10
Sheets, No. 24, galvan., Gary	2.95	2.95	2.95	2.70
Plain wire, Pittsburgh	2.20	2.20	2.10	2.10
Tin plate, per base box, Pitts.	5.25	5.25	4.65	4.25
Wire nails Pittsburgh	2.35	2.35	2.10	1.85
Semifinished Material				
Sheet bars, open-hearth, Youngs.	26.00	26.00	26.00	26.00
Sheet bars, open-hearth, Pitts.	26.00	26.00	26.00	26.00
Billets, open-hearth, Pittsburgh	26.00	26.00	26.00	26.00
Wire rods, Pittsburgh	36.00	36.00	35.00	35.00

	Feb. 3, 1934	Jan. 1934	Nov. 1933	Feb. 1933
Pig Iron				
Bessemer, del. Pittsburgh	19.26	19.26	19.26	15.76
Basic, valley	17.00	17.00	17.00	14.00
Basic, eastern, del. eastern Pa.	18.76	18.76	17.76	13.50
No. 2 foundry, del. Pittsburgh	18.76	18.76	18.76	15.76
No. 2 foundry, Chicago	17.50	17.50	17.50	15.50
Southern No. 2, Birmingham	13.50	13.50	13.50	11.00
No. 2X, Eastern, del. Phila.	19.63	19.63	18.63	13.76
Malleable, valley	17.50	17.50	17.50	14.50
Malleable, Chicago	17.50	17.50	17.50	15.50
Lake Superior charcoal, del. Chi.	23.54	23.54	23.54	23.04
Gray forge, del. Pittsburgh	18.38	18.38	18.38	15.63
Ferromanganese, del. Pittsburgh	90.24	90.24	87.24	73.24
Scrap				
Heavy melting steel, Pittsburgh	$13.50	13.05	11.65	8.35
Heavy melting steel, eastern Pa.	11.75	11.62½	9.55	6.50
Heavy melting steel, Chicago	10.75	10.45	8.35	5.25
No. 1 wrought, eastern Pa.	12.75	12.65	10.15	6.50
No. 1 wrought, Chicago	10.35	9.45	8.10	5.00
Rails for rolling, Chicago	11.75	11.25	10.25	7.75
Coke				
Connellsville, furnace, ovens	3.50	3.60	3.75	1.75
Connellsville, foundry, ovens	4.25	4.25	4.25	2.50

Steel, Iron, Raw Material and Metals Prices

Prices conform to American Iron and Steel institute schedules. Asterisks denote price changes this week

Sheet Steel

HOT ROLLED No. 10
(24 to 48 inches wide)

Pittsburgh, base	1.75c
Gary, base	1.85c
Chicago, del.	1.88c
New York, del.	2.08c
Philadelphia, del.	2.04c
Birmingham, base	1.90c
St. Louis, del.	2.07c
F.o.b. cars, dock Pacific ports	2.42½c

HOT ROLLED ANN. No. 24

Pittsburgh, base	2.25c
Gary, base	2.35c
Chicago, del.	2.38c
Detroit, del.	2.45c
New York, del.	2.58c
Philadelphia, del.	2.54c
Birmingham, base	2.40c
St. Louis, del	2.57c
F.o.b. cars, dock, Pacific ports	2.95c

GALVANIZED No. 24

Pittsburgh, base	2.85c
Gary, base	2.95c
Chicago, del.	2.98c
Philadelphia, del.	3.14c
New York, del.	3.18c
Birmingham, base	3.00c
St. Louis, del	3.17c
San Francisco, f.o.b. cars, dock	3.55c

TIN MILL BLACK No. 28

Pittsburgh, base	2.65c
Gary, base	2.75c
St. Louis, del.	2.97c

COLD ROLLED No. 10

Pittsburgh, base	2.30c
Detroit, delivered	2.50c
Gary, base	2.40c
Philadelphia, del.	2.59c
New York, del.	2.63c

COLD ROLLED No. 20

Pittsburgh, base	2.75c
Detroit, delivered	2.95c
Gary, base	2.85c
Philadelphia, del.	3.04c
New York, del.	3.08c

ENAMELING SHEETS

Pittsburgh, No. 10	2.45c
Pittsburgh, No. 20	2.90c

Tin and Terne Plate

Per 100-lb. box, Pittsburgh. Gary base, 10 cents higher

Tin plate, coke base, contract	$5.25
Do., stock	4.55
Long ternes, No. 24 unassorted	3.25c

Corrosion and Heat Resistant Alloys

Base, Pittsburgh

18% chrome, 8% nickel; sheets, 35c; plates, 28c; bars, 24c; hot-rolled strip, 24.50c; cold-rolled strip, 32.00c.

	A	B	C	D
Bars	17c	18.5c	21c	26c
Plates	20c	21.5c	24c	29c
Sheets	25c	28c	31c	35c
Hot strip	17c	18.5c	21c	26c
Cold strip	22.5c	24c	27c	35c

Carbon 0.12 and under; no nickel. A has chrome 15% and under. B over 15/18% inc., C over 19/23% inc., D over 23/30%.

Steel Plates

Pittsburgh, base	1.70c
New York, del.	1.98c
Philadelphia, del	1.88½c
Boston, del.	2.10c
Buffalo, del	1.93½c
Chicago, base	1.75c
Cleveland, del.	1.88½c
Birmingham, base	1.85c
Coatesville, base	1.80c
Sparrow's Pt., base	1.80c
Pacific Coast, f.o.b. cars, dock	2.25c
St. Louis del	1.97c

Structural Shapes

Pittsburgh, base	1.70c
Philadelphia, del.	1.90½c
New York, del.	1.95½c
Boston, del.	2.08½c
Bethlehem, base	1.80c
Chicago, base	1.75c
Cleveland, del.	1.88½c
Buffalo, base	1.80c
Birmingham, base	1.85c
Pacific Coast, f.o.b. cars, dock	2.25c

Bars

SOFT STEEL

Pittsburgh, base	1.75c
Chicago, base	1.80c
Birmingham, base	1.90c
Buffalo, base	1.85c
Cleveland, base	1.80c
Detroit, del.	1.90c
Pacific Coast ports, cars, dock, c.i.f.	2.30c
Philadelphia, del.	2.04c
Boston, del.	2.19c
New York, del.	2.08c
Pitts., forg. qual.	1.75c-2.25c

RAIL STEEL
To Manufacturing Trade

Pittsburgh	1.65c
Chicago	1.70c
Cleveland	1.70c
Gary, Ind.	1.70c
Buffalo	1.75c

IRON

Terre Haute, Ind. base	1.60c
Philadelphia, base..	1.74c
Pittsburgh, refined..	2.75c-7.50c

REINFORCING
New billet, cut lengths, carlots

Pittsburgh	1.90c
Chicago, Gary, Buffalo, Cleve., Birm., Young...	1.95c
Gulf ports	2.30c
Pacific coast ports	2.45c
Philadelphia, del.	2.19c

Rail steel

Pittsburgh, base	1.75c
Chicago, Buffalo, Cleveland, Birm., Young.	1.80c
Gulf ports	2.15c
Pacific coast ports	2.30c

Wire Products □ □

(Prices apply to straight or mixed carloads; pool cars, or less, 10c up. 10% dis. on nail extras on straight or mixed carloads to one consignee.)

Base, Pittsburgh-Cleveland
(Per 100-lb. keg)

Standard wire nails	$2.35
Cement coated nails	2.35
Galvanized nails, 15 gage and coarser	4.35c
Do., 16 gage and finer..	4.85c

(Per pound)

Polished staples	3.05c
Galvanized fence staples	3.30c
Barbed wire, galv.	2.85c
Annealed fence wire	2.35c
Galvanized fence wire	2.70c
Woven wire fencing (base column, c.l.)	$60.00
Plain wire, 6-9 gage to mfg trade	2.20c

Anderson, Ind., Chicago up $1; Duluth up $2; Birmingham up $3.

Spring wire	3.20c

Chicago and Waukegan $1 higher, Worcester $2 higher.

Cold-Finished Carbon Bars

Base Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,999 lbs.	2.10c
20,000 to 59,999 lbs.	2.05c
60,000 to 99,999 lbs.	2.00c
100,000 lbs. and over	1.97½c

Chicago, Cleveland, up 5c; Buffalo, up 10c; Detroit, up 20c; eastern Michigan, up 25c.

Shafting □ □ □

Turned and ground, Pitts. base	
1⅛-inch	3.40c
1 3/16 to 1½-inch	2.90c
1 3/16 to 1⅞-inch	2.75c
1 15/16 to 2⅞-inch	2.60c
2 1/16 to 7-inch	2.45c

Alloy Steel Bars □

Hot rolled

Pittsburgh, Buffalo, Chicago, Massillon, Canton	2.45c
Bethlehem	2.55c

Alloy	S.A.E.	Diff.	S.A.E.	Alloy Diff
	2000	0.25	3100	0.55
	2100	0.55	3200	1.35
	2300	1.50	3300	3.80
	2500	2.25	3400	3.20

4100 .15 to .25 Mo.	0.50
4600 .20 to .30 Mo. 125-1.75 Ni.	1.05
5100 .80-1.10 Cr.	0.45
5100 Cr. spring	base
6100 bars	1.20
6100 spring	0.70
Cr., Ni., Van.	1.50
Carbon van	0.95
9250 carbon base plus extras	

Strip and Hoops □

Hot strip to 23 1/16-in. Pittsburgh	1.75c
Do., Chicago	1.85c
Do., del. Detroit..	1.95c
Do., del. Phila.	2.04c
Do., del. N. Y.	2.08c
Cooperage hoop, Pittsburgh	1.85c
Do., Chicago	1.95c
Cold-rolled strip, Pitts., Cleve.	2.40c
Worcester	2.60c

Rails, Track Material □

(Gross Ton)

Standard rails, mill	$36.37½
Relay rails, Pitts. 20-45 lbs.	$26.00
50-60 lbs.	$23.00
70-75 lbs.	$18.00
*80-85 lbs.	$25.00
*100 lbs.	$26.00
Light rails, billet qual., Pitts., Chi.	$32.00
Do., reroll. qual.	$31.00
Angle bars, mills	2.55c
Spikes, R. R., base..	2.40c
Track bolts, base	3.55c
Tie plates, base	1.90c

Base, light rails 25 to 40 lbs.; 50 to 60 lbs. inclusive up $5; 16 and 20 lbs., up $1; 12 lbs., up $2; 8 and 10 lbs., up $5. Base railroad spikes 200 kegs or more; base tie plates 20 tons or more; diff. for less.

Bolts and Nuts □ □

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade for all case lots. Dec. 1, 1932, lists.

CARRIAGE BOLTS

All sizes, cut thread	70 off
Rolled thread, ½ x 6 and smaller	70 off

MACHINE BOLTS

All sizes. cut thread, lag screws, plow bolts, Nos. 1-2-3-7 heads, tap bolts, blank bolts, stud bolts without nuts	70 off
Tire bolts	60 off
Stove bolts, 70-25-10 off in pkgs.; 83 off in bulk, 5000 or more of a size.	
Rolled thread machine bolts, ½ x 6 and smaller,	70 off
Step bolts	66 off
Elevator bolts	66 off

NUTS

Semifinished	70 off

HEXAGON CAP SCREWS

Milled	80-10-10 off
Upset 1-in., smaller	85 off

SQUARE HEAD SET SCREWS

Upset, 1-in., smaller	75-10 off
Upset, larger than 1-in.	75-10 off
Headless set screws	75 off

Rivets, Wrought Washers

Struc., c.l., Pittsburgh, Cleveland	2.75c
Struc., c.l., Chicago	2.85c
⅞-in. and smaller, Pitts., Chi., Cleve.	70 and 10 off
Wrought washers, Pitts., Chi., Phila.	6.00-6.25 off

Cut Nails, Piling □

Cut nails, Pitts.; (10% discount on size extras)	$2.75
Do. less carloads, 5 kegs or more; no discount on size extras	$3.00
Do., less than 5 kegs; no discount on size extras	$3.15
Steel piling, Pittsburgh	2.00c
Steel piling, Chi., Buff.	2.10c

Pipe and Tubing

Base $200 net ton, except on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less. Chicago delivered 2½ points less. Wrought pipe, Pittsburgh base.

BUTT WELD
Steel

In.	Blk.	Gal.
¼ and ⅜	57	38½
½	62	50½
¾	65½	55½
1—3	67½	58½

Iron

½	31½	15
¾	36½	20
1—1¼	39½	25½
2	41½	26

LAP WELD
Steel

2	63½	54½
2½—3	66½	57½
3½—6	68½	59½
7 and 8	67½	57½
9 and 10	67	57

Iron

2	37	22½
2½—3½	38	25
4—8	40	28½
9—12	38	24½

LINE PIPE
Steel

⅛-inch, butt weld	50½
¼—⅜, butt weld	56
½, butt weld	61
¾, butt weld	64½
1—3, butt weld	66½
2-inch, lap weld	62½
2½—3, lap weld	65½
3½—6, lap weld	67½
7—8, lap weld	66½

Iron

⅛—1½ inch, black and galv. take 4 pts. over; 2½—6 inch 2 pts. over discounts for same sizes, standard pipe list. 8—12 inch no extra.

BOILER TUBES

C. L. Discounts, f.o.b. Pitts. Lap Weld Steel		Charcoal Iron	
2—2¼	33	1¾	8
2½—2¾	40	2—2¼	13
3	47	2½—2¾	16
3¼—3¾	50	3	17
4	52	3¾—3½	18
4½—6	42	4	20
1½	1	4½	21

In lots of a carload or more, above discounts subject to preferential of two 5% discounts on steel and 10% on charcoal iron.

Lapwelded steel: Under 10,000 lbs., 6 pts. under base and one 5%; on 10,000 lbs. to carload, 4 pts. under base and two 5%. Quantity discounts same as for hot-rolled. Charcoal iron: Under 10,000 lbs., 2 pts. under base; on 10,000 lbs. to carload, base and one 5%.

SEAMLESS BOILER TUBES

Cold Drawn			
2—2¼	27	3¼—3½	41
2½—2¾	34	4	46
3	38	4½, 5, 6	43

(On 1—1¾-inch sizes mechanical tubing dis. apply.)

Hot Rolled			
2—2¼	38	3¼—3½	47
2½—2¾	40	4	49
3	44	4½, 5, 6	42

Quantity discounts: Under 10,000 lbs., 10 pts. and 5%; 10,000 to 24,999 lbs., 6 pts. and 5%; 25,000 lbs to carload, 2 pts. and 5 and 5%; carload and over, base discount and 5 and 5%. No extra for lengths 24 ft. and under.

Seamless Tubing □

Cold drawn; f.o.b. mill disc.

100 ft. or 150 lbs.	32%
15,000 ft. or 22,500 lbs.	70%

Cast Iron Water Pipe □

Class B Pipe Per Net Ton

6-in. & over, Birm.	$36.00-37.00
4-in., Birm.	39.00-40.00
4-in., Chicago	47.00-48.00
6 to 24-in., Chicago	44.00-45.00
6-in. & over, east. fdy.	40.00
Do., 4-in.	43.00

Class A pipe $3 over Class B

Stnd. fitgs., Birm. base	$90.00

Six to 24-inch, fittings, base; over 24-inch plus $20; 4-inch, plus $10; 3-inch, plus $20; gas pipe fittings, 5 higher.

Semifinished Steel □

Prices Per Gross Ton

BILLETS AND BLOOMS
4 x 4 inch base

Pitts., Chi., Cleve., open-hth. & bess.	$26.00
Philadelphia	31.30
Forging, Pitts., Chi.	31.00

SHEET BARS

Pitts., Cleve., Yong.	26.00
Chicago	26.00
Canton, O.	26.00

SLABS

Pitts., Cleve., Yong.	26.00

WIRE RODS

Pitts., Cleveland	36.00
Chicago	37.00

SKELP

All grades, Pitts. and Chicago	1.60c

Coke □ □ □

Price Per Net Ton

BEEHIVE OVENS

Connellsville fur.	$3.50
Connellsville fdry.	4.25
Connel. prem. fdry.	5.00- 5.25
New River fdry.	6.00
Wise county fdry.	4.25- 5.00
Wise county fur.	3.50- 4.25

BY-PRODUCT FOUNDRY

Newark, N. J., del.	8.75- 9.30
Chi. ov., outside del.	8.50
Chicago, del.	9.25
New England, del.	10.50
St. Louis, del.	9.25
Birmingham, ovens	5.00
Indianapolis, del.	8.75
Ashland, Ky., Connellsville basis	6.00
Portsmouth, ovens, Connellsville basis	6.00
Buffalo, ovens	7.50- 8.00
Detroit, ovens	8.00
Philadelphia, del.	9.00

Coke By-Products □

Per gallon, producers' plants.

Tank lots	Spot
Pure benzol	$0.205
90 per cent benzol	$0.205
Toluol	0.30
Solvent naphtha	0.26
Commercial xylol	0.26

Per lb. f.o.b. New York

Phenol (200 lb. drums)	0.173c
Do., (100 lb.)	0.173c

Per lb., producers' plants

Naphthalene flakes and balls	6.00- 7.25

Per 100 lb. Atlantic seaboard

Sulphate of ammonia	$1.25

Pig Iron

Delivered prices do not include switching charges except as noted. No. 2 foundry iron is 1.75-2.25 silicon; 25-cent differentials apply for each 0.25 silicon above 2.25. Gross tons.

	No. 2 Fdry.	Malleable	Basic	Bessemer
Basing Points:				
Bethlehem, Pa.	$18.50	$19.00	$18.00	$19.50
Birdsboro, Pa.	18.50	19.00	18.00	19.50
Swedeland, Pa.	18.50	19.00	18.00	19.50
Sparrows Point, Md.	18.50	.....	18.00	.....
From Swedeland, Pa., del. to Philadelphia	19.26	19.76	18.76	.....
From Bethlehem, del. to Brooklyn	20.77	21.27	.....	.....
From Bethlehem, del. to Newark, N. J.	19.99	20.39	.....	.....
Basing Point:				
Everett, Mass.	18.50	19.00	18.00	19.50
From Everett, del. to Boston	19.00	19.50	18.50	20.00
Basing Point:				
Buffalo	17.50	18.00	16.50	18.50
From Buffalo, del. to Boston	19.00	19.50	18.50	20.00
Basing Points:				
Neville Island, Pa.	18.00	18.00	17.50	18.50
Sharpsville, Pa.	17.50	17.50	17.00	18.00
Youngstown, O.	17.50	17.50	17.00	18.00
From Neville Island, Pa., del. to Pittsburgh district	(Neville Island base, plus 63c to $1.13 switching charges)			
Basing Points:				
Erie, Pa.	17.50	18.00	17.00	18.50
Cleveland	17.50	17.50	17.00	18.00
Toledo, O.	17.50	17.50	17.00	18.00
Detroit	17.50	17.50	17.00	18.00
From Detroit, del. to Saginaw, Mich.	19.60	19.60	19.10	20.10
From Cleveland, del. to Akron, Canton, O.	18.76	18.76	18.26	19.26
From Toledo, del. to Mansfield, O.	19.26	19.26	18.76	19.76
Basing Point:				
Jackson, O.	19.25	19.25	18.75	.....
Hamilton, O.	17.50	17.50	17.00	18.00
From Hamilton, del. to Cincinnati	18.51	18.51	18.01	19.01
Do., del. to Indianapolis	19.77	19.77	19.27	20.27
Basing Points:				
Duluth	18.00	18.00	.....	18.50
Chicago	17.50	17.50	17.00	18.00
Granite City, Ill.	17.50	18.00	17.00	.....
From Duluth, del. to St. Paul	19.94	19.94	.....	20.44
From Chicago, del. to Milwaukee	18.50	18.50	18.00	19.00
From Chicago, Toledo or Detroit, del. to Muskegon, Mich.	20.40	20.40	19.90	20.90
From Granite City, del. to St. Louis	18.00	18.50	17.50	.....
Basing Point:				
†Birmingham, Ala.	13.50	.....	12.50	.....
From Birmingham, del. to:				
Boston	18.62	.....	18.12	.....
Newark, N. J.	19.58	.....	.....	.....
Brooklyn, N. Y.	20.39	.....	.....	.....
Baltimore	19.02	.....	18.52	.....
Philadelphia	18.88	.....	18.38	.....
Cleveland	17.62	.....	17.50	.....
Cincinnati	18.13	.....	17.13	.....
Chicago	17.72	.....	17.22	.....
St. Louis	17.62	.....	17.50	.....

†Southern delivery only. Prices at northern points are adjusted to quotations on northern iron.

Basing Point:
Provo, Utah 16.50

LOW PHOS.

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.—$23.00. Basing point: Johnson City, Tenn.—$23.00
Philadelphia, standard and copper bearing 24.13

GRAY FORGE		CHARCOAL	
Valley furnace	17.25	Lake Superior fur.	20.50
Pitts. dist. fur.	17.75	Do., del. Chicago	23.54

SILVERY

Jackson county, O., base; 6%—$22.25; 7—$23.25; 8—$24.25; 9—$25.25; 10—$26.25; 11—$27.75.

BESSEMER FERROSILICON

Jackson County, O., base; 10%—$27.25; 11—$28.75; 12—$30.25; 13—$31.75; 14—$33.25; 15—$34.75; 16—$36.25.

Iron Ore □ □

LAKE SUPERIOR ORE
Gross ton, 51½% Lower Lake Ports

Old range bess.	$4.30
Mesabi bessemer	4.65
Old range nonbess.	4.65
Mesabi nonbess.	4.50
High phosphorus	4.40

EASTERN LOCAL ORES
Cents, unit, del. E. Pa.

Foundry and basic, 56-63% con. (nom.)	8.00- 9.00
Cop.-free low phos. 58-65% (nom.)	10.00-10.50

FOREIGN ORE
Cents per unit, f.a.s. Atlantic ports (nominal)

Foreign manganiferous ore, 45.55% iron, 6-10% man.	10.00
No. Afr. & low phos.	9.50
Swedish basic, 65%	9.00
Swedish low phos.	9.50
Spanish No. Africa basic, 50 to 60%	9.00
Tungsten, spot, sh. ton unit, duty pd.	$14.00-14.25
N. F. fdy., 55%	7.00
Chrome ore 48% gross ton, c.i.f.	$18.00

Manganese Ore □

(Nominal)

Prices, not including duty, cents per unit, cargo lots.

Caucasian, 52-55%	24.00
So. African, 52%	24.00
So. Afr., 49-51%	22.00
Indian, 58-50%	nominal
Indian, 48-50%	nominal

Refractories □ □

Per 1000 f.o.b. Works

FIRE CLAY BRICK
First Quality

Pa., Ohio, Ill., Ky., Md., Ga., Mo.	$45.00
Alabama	48.00

Second Quality

Pa., Ohio, Ill., Ky., Md., Mo., Ga., Ala.	40.00
MALLEABLE BUNG BRICK all bases	50.00

SILICA BRICK

Pennsylvania	$45.00
Joliet, E. Chicago	54.00
Birmingham, Ala.	52.00

MAGNESITE

Dead burned grain, Chester, Pa., Baltimore bases, net	40.00
Domes, Chewelah, Wash., base	22.00

BASIC BRICK
Net ton, f.o.b. Baltimore, Plymouth, Meeting, Pa., Chester, Pa.

Magnesite brick	$65.00
Chrome brick	45.00
Chemically bonded magnesite	55.00

Fluorspar 85-5 □ □

Washed gravel, duty paid, tide, gross ton	$21.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads	$14.75-15.00

Ferroalloys □ □

Dollars, except Ferrochrome

Ferromanganese, 78-82% tidewater, duty paid	85.00
del. Pittsburgh	90.24
Spiegeleisen, 19-20%, dom., fur., spot†	26.00
Ferrosilicon, 50%, freight all., cl.	77.50
Do., less carload	85.00
Do., 75 per cent	126-130.00
Spot, $5 a ton higher.	
Silicomang., 2½ carb	90.00
2% carbon	95.00
1% carbon	105.00
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. con. del.	10.00
Ferrotungsten, stand., lb. cont.	1.16- 1.25
Ferrovanadium, 35 to 40%, lb. cont., on analysis	2.70- 2.90
Ferrotitanium, c. l., prod. plant, frt. allow., net ton	137.50
Spot, 1 ton, frt., allow., lb.	7.00
Do., under 1 ton	7.50
Ferrophosphorus, per ton, c. l., 17-19%, Rockdale, Tenn., basis, 18%, $2 unitage	50.00
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $2.75 unitage	65.00
Ferromolybdenum, stand. 50-60%, lb.	0.95
Molybdate, lb. cont.	0.80

†Carloads. Quan. diff. apply.

Nonferrous Mill Products

F.o.b. mill base, cents per lb. except as specified. Copper, brass products based on 8.25c Conn. copper

Sheets

Yellow brass (high)	13.75
Copper, hot rolled	15.00
Lead, cut, to jobbers	7.75
Zinc, 100-lb. base	9.00

Tubes and Pipes

High yellow brass	16.25
Seamless copper	16.25

Rods

High yellow brass	12.25
Copper, hot rolled	12.25

Anodes

Copper, untrimmed	12.75

Wire

Yellow brass (high)	14.25

Old Metals □ □

Deal. buying prices, cents lb.

No. 1 Composition Red Brass

New York	4.50- 4.75
*Chicago	4.37½-4.87½
Cleveland	5.00- 5.25
*St. Louis	4.75- 5.00

Heavy Copper and Wire

New York	6.12½- 6.25
*Chicago, No. 1	5.75- 6.00
Cleveland	5.50- 5.75
*St. Louis	5.75- 6.00

Composition Brass Borings

New York	4.25- 4.50

Light Copper

New York	5.25- 5.50
*Chicago	4.50- 4.75
Cleveland	5.00- 5.25
*St. Louis	4.75- 5.00

Light Brass

*Chicago	2.50- 2.75
Cleveland	3.00- 3.25

Lead

New York	3.00- 3.25
Cleveland	2.75- 3.10
Chicago	2.75- 3.00
St. Louis	3.10- 3.25

Zinc

New York	2.25- 2.50
Cleveland	2.25
*Chicago	2.12½-2.37½
*St. Louis	2.50- 2.75

Aluminum

Clips, soft. Cleve.	13.50-14.00
Borings, Cleveland	5.50- 6.50
*Mixed, cast Cleve.	9.75-10.25
*Mixed, cast, St. L.	9.00- 9.50

Secondary Metals □

Brass ingot, 85-5-5-5	8.25
*Remelt Al., No. 12	14.00-14.50

Iron and Steel Scrap Prices

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated

HEAVY MELTING STEEL

Birmingham	10.00-10.50
Boston, dealers	7.00- 7.25
Buffalo, No. 1	10.50-11.00
Buffalo, No. 2	9.00- 9.50
Chicago	10.50-11.00
Cleveland, No. 1	10.50-11.00
Cleveland, No. 2	10.00-10.50
Detroit, No. 1	9.00- 9.50
Detroit, No. 2	8.00- 8.50
Eastern Pa.	11.50-12.00
Eastern Pa., No. 2	9.50-10.00
Federal, Ill.	8.75- 9.25
Granite City, Ill.	9.00- 9.50
N. Y., deal. R. R.	8.75- 9.00
N. Y., deal. No. 2	7.50
Pittsburgh, No. 1	13.25-13.75
St. Louis, No. 1 del.	10.50-11.00
Valleys, No. 1	13.00-13.50

COMPRESSED SHEETS

Buffalo, dealers	9.00- 9.50
Chicago, factory	9.25- 9.75
Cleveland	9.50-10.00
Detroit	8.50- 9.00
E. Pa., new mat.	10.50
Pittsburgh	13.00-13.50
Valleys	12.50-13.00

BUNDLED SHEETS

Buffalo	6.00- 6.50
Cincinnati, del.	5.75- 6.25
Cleveland	6.75- 7.25
Pittsburgh	11.00-11.50
St. Louis	5.75- 6.25

SHEET CLIPPINGS LOOSE

Chicago	5.50- 6.00
Cincinnati	5.00- 5.50
Detroit	6.00- 6.50
St. Louis	4.50- 5.00

STEEL RAILS, SHORT

Birmingham	11.50-12.50
Boston, dealers	7.00- 7.25
Buffalo	12.00-13.00
Chicago (3 ft.)	12.00-12.50
Chicago (2 ft.)	13.00-13.50
Cincinnati, del.	11.00-11.50
Detroit	10.50-11.00
Pitts., (open-hearth 3 ft. and less	15.00-15.50
St. Louis	12.50-13.00

STOVE PLATE

Birmingham	6.50- 7.50
Boston, dealers	4.75- 5.00
Buffalo	9.00-10.00
Chicago, net	7.50- 8.00
Cincinnati, dealers	6.00- 6.50
Detroit, net	5.50- 6.00
Eastern Pa.	8.50- 9.00
N. Y., deal. fdry.	5.50- 6.00
St. Louis	6.50- 7.00

COUPLERS, SPRINGS

Buffalo	11.50-12.00
Chicago, springs	11.50-12.00
Eastern Pa.	14.00-15.00
Pittsburgh	15.00-15.50
St. Louis	10.50-11.00

ANGLE BARS—STEEL

Chicago	11.50-12.00
St. Louis	10.00-10.50

LOW PHOSPHORUS

Buffalo, billets and bloom crops	11.50-12.50
Cleveland, billet, bloom crops	13.50-14.00
Eastern Pa. crops	14.00-14.50
Pittsburgh, billet, bloom crops	16.00-16.50
Pittsburgh, sheet bar crops	16.00-16.50

FROGS, SWITCHES

Chicago	10.50-11.00
St. Louis	10.00-10.50

SHOVELING STEEL

Chicago	10.50-11.00
St. Louis	8.25- 8.75

RAILROAD WROUGHT

Birmingham	7.00- 8.00
Boston, dealers	5.00- 5.50
Buffalo, No. 1	8.00- 8.50
Buffalo, No. 2	10.50-11.00
Chicago, No. 1, net	9.00- 9.50
Chicago, No. 2	10.50-11.00
Cincinnati, No. 2	8.50- 9.00
Eastern Pa.	12.50-13.00
N. Y., No. 1 deal	8.00- 8.50
St. Louis, No. 1	7.00- 7.50
St. Louis, No. 2	8.75- 9.25

SPECIFICATION PIPE

Boston	4.50- 4.75
Eastern Pa.	10.00
New York, dealers	5.25- 5.50

BUSHELING

Buffalo, No. 1	9.00- 9.50
Chicago, No. 1	9.00- 9.50
Cinci., No. 1 deal	6.00- 6.50
Cincinnati, No. 2	2.50- 3.00
Cleveland, No. 2	8.25- 8.75
Detroit, No. 1 new	8.00- 8.50
St. Louis, No. 1	6.50- 7.00
Valleys, new No. 1	12.00-12.50

MACHINE TURNINGS

Birmingham	4.50- 5.00
Boston, dealers	3.00- 3.25
Buffalo	7.00- 7.50
Chicago	6.50- 7.00
Cincinnati, dealers	4.75- 5.25
Cleveland	8.25- 8.50
Detroit	6.00- 6.50
Eastern Pa.	7.00- 7.50
New York, dealers	3.25- 3.50
Pittsburgh	9.50-10.00
St. Louis	4.25- 4.75
Valleys	10.00-10.50

BORINGS AND TURNINGS

For Blast Furnace Use

Boston, dealers	1.75- 2.00
Buffalo	7.50- 8.00
Cincinnati, dealers	4.75- 5.25
Cleveland	8.25- 8.75
Detroit	7.00- 7.50
Eastern Pa.	6.00- 6.50
New York, dealers	2.00- 2.50
Pittsburgh	7.75- 8.25

CAST IRON BORINGS

Birming., plain	4.00- 4.50
Boston, chemical	8.50- 9.00
Boston, dealers	3.25- 3.50
Buffalo	7.50- 8.00
Chicago	7.00- 7.50
Cincinnati, dealers	4.75- 5.25
Cleveland	8.25- 8.75
Detroit	7.00- 7.50
E. Pa., chemical	12.00-15.00
New York, dealers	3.00- 3.50
Pittsburgh	7.75- 8.25
St. Louis	4.00- 4.50

PIPE AND FLUES

Cincinnati, dealers	4.00- 4.50

RAILROAD GRATE BARS

Buffalo	6.00- 6.50
Chicago, net	7.00- 7.50
Cincinnati	5.25- 5.75
Eastern Pa.	8.50- 9.00
New York, dealers	5.00- 5.50
St. Louis	5.50- 6.00

FORGE FLASHINGS

Boston, dealers	5.00- 5.25
Buffalo	8.50- 9.00
Cleve., over 10 in.	9.25- 9.75
Detroit	7.50- 8.00

FORGE SCRAP

Boston, dealers	4.25- 4.50
Chicago, heavy	11.00-11.50
Eastern Pa.	10.50-11.00

ARCH BARS, TRANSOMS

St. Louis	9.75-10.25

AXLE TURNINGS

Boston, dealers	3.50- 3.75
Buffalo	7.50- 8.00
Chicago, elec. fur.	9.00- 9.50
Cleveland	9.00- 9.50
Eastern Pa.	11.00
St. Louis	5.00- 5.50

STEEL CAR AXLES

Birmingham	11.00-11.50
Boston, ship. point.	8.00- 8.50
Buffalo	10.00-11.00
Chicago, net	10.50-11.00
Eastern Pa.	14.00
St. Louis	11.50-12.00

SHAFTING

Boston, ship. point.	10.25-10.50
Eastern Pa.	16.25-16.50
New York, dealers	11.00-11.50
St. Louis	9.00- 9.50

CAR WHEELS

Birmingham, iron	9.00-10.00
Boston, iron deal.	6.00- 6.50
Buffalo, iron	9.00- 9.50
Buffalo, steel	11.00-12.00
Chicago, iron	10.50-11.00
Chicago, rolled steel	11.50-12.00
Cincinnati, iron	8.25- 8.75
Eastern Pa., iron	12.00-12.50
Eastern Pa., steel	14.00-15.00
Pittsburgh, iron	11.50-12.00
Pittsburgh, steel	15.00-15.50
St. Louis, iron	8.75- 9.25
St. Louis, steel	11.00-11.50

NO. 1 CAST SCRAP

Birmingham	9.00- 9.50
Boston, No. 2	5.50- 5.75
Boston, tex. con.	10.50-11.00
Buffalo, cupola	10.50-11.50
Buffalo, mach.	11.00-12.00
Chicago, agri. net	8.00- 8.50
Chicago, mach. net	9.00-10.00
Chi., railroad net	8.50- 9.00
Cinci., mach. cu. p	9.00- 9.50
Cleveland, cupola	10.50-11.00
Detroit, net	8.75- 9.25
Eastern Pa., cupola	11.50-12.50
Pittsburgh, cupola	12.50-13.00
San Francisco, del.	13.50-14.00
Seattle	7.00- 8.50
St. Louis, No. 1	8.50- 9.00
St. L., No. 1 mach.	9.00- 9.50

HEAVY CAST

Boston, del.	6.25- 6.50
Buffalo, break.	8.00- 8.50
Cleveland, break.	8.00- 8.50
Detroit, break	7.00- 7.50
Detroit, auto net	9.50-10.00
Eastern Pa.	11.00-11.50
N. Y., No. 1, deal	7.25- 7.75
N. Y., break deal	7.25- 7.75
Pittsburgh	11.50-12.00

MALLEABLE

Boston, consum.	12.00-12.25
Buffalo	11.00-11.50
Chicago, R. R.	11.50-12.00
Cinci., agri. del.	8.00- 8.50
Cinci., R. R. del.	8.50- 9.00
Cleveland, rail	11.00-11.50
Detroit, auto	8.50- 9.00
St. Louis, R. R.	9.00- 9.50
Eastern Pa., R. R.	11.50-12.50

RAILS FOR ROLLING

5 feet and over

Birmingham	11.00-11.50
Boston, dealers	7.25- 7.50
Buffalo	9.25- 9.75
Chicago	11.50-12.00
Eastern Pa.	13.00
New York, dealer	7.00- 7.50
St. Louis	10.75-11.25

LOCOMOTIVE TIRES

Chicago (cut)	11.00-11.50
St. Louis, No. 1	8.75- 9.25

LOW PHOS. PUNCHINGS

Buffalo	11.00-11.50
Chicago	12.50-13.00
Eastern Pa.	14.00-15.00
Pittsburgh	15.00-15.50

Nonferrous Metal Prices of the Week

Spot unless otherwise specified. Cents per pound

	Copper: Electro., del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin, New York: Spot	Straits Tin, New York: Futures	Lead, New York: N. Y.	Lead: East St. L.	Zinc: St. L.	Aluminum 98-99%	Antimony Spot, N. Y.	Ingot Nickel
Jan. 27	8.25	8.37½	8.00	50.90	51.15	4.00	3.90	4.25	*22.90	7.15	35.00
Jan. 29	8.25	8.37½	8.00	51.30	51.65	4.00	3.90	4.25	*22.90	7.15	35.00
Jan. 30	8.25	8.37½	8.00	51.35	51.65	4.00	3.90	4.30	*22.90	7.15	35.00
Jan. 31	8.00	8.37½	7.75	51.00	51.30	4.00	3.90	4.30	*22.90	7.15	35.00
Feb. 1	8.00	8.37½	7.75	51.00	51.30	4.00	3.90	4.30	*22.90	7.15	35.00
Feb. 2	8.00	8.37½	7.75	50.00	50.15	4.00	3.90	4.30	*22.90	7.15	35.00

*Nominal quotation. Market range 19.90c to 22.90c.

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS	□
Baltimore* ..	2.75c
Boston††	2.90c
Buffalo	2.95c
Chattanooga..	3.26c
Chicago	2.90c
Cincinnati	3.10c
Cleveland	2.90c
Detroit	2.98½c
Houston	3.00c
Los Angeles..	3.40c
New Orleans	3.00c
New York‡(d)	3.17c
Pittsburgh	2.85c
Philadelphia*	2.75c
San Francisco	3.55c
Seattle	3.40c
St. Louis	3.14c
St. Paul	3.00c
Tulsa	3.25c

IRON BARS	□
Portland	3.40c
San. Fran.	3.55c
Baltimore*	2.75c
Baltimore* ...	2.60c
Chattanooga..	3.26c
Chicago	2.75c
Cincinnati	3.10c
Detroit	2.98½c
New York‡(d)	3.10c
Philadelphia*	2.75c
St. Louis	3.14c
Tulsa	3.25c

REINFORC. BARS	□
Boston 2.75c-3.25c	
Buffalo	1.95c
Chattanooga..	3.26c
Chicago 1.95c-2.10c	
Cleveland (c)	1.97½c
Cincinnati	3.10c
Houston	3.25c
Los Ang., cl...	3.10c
New Orleans	3.00c
New York	3.17c
Philadelphia..	2.62½c
Pitts., plain...	3.00c
Pitts., twisted squares	3.12½c
Seattle	3.50c
St. Louis	3.29c
Tulsa	3.25c
Young. 2.30c-2.60c	

SHAPES	□
Baltimore* ...	2.60c
Boston††	3.07c
Buffalo	3.20c
Chattanooga..	3.46c
Chicago	3.10c
Cincinnati	3.30c
Cleveland	3.21c
Detroit	3.30c
Houston	3.00c
Los Angeles..	3.40c
New Orleans	3.50c
New York(d)	3.27c
Philadelphia*	2.75c
Pittsburgh	3.05c
Portland	3.40c
San Francisco	3.50c
Seattle	3.40c
St. Louis	3.34c
St. Paul	3.25c
Tulsa	3.50c

PLATES	□
Baltimore*	2.75c
Boston††	3.08c
Buffalo	3.20c
Chattanooga..	3.46c
Chicago	3.10c
Cincinnati	3.30c
Cleveland, ¼ in. and thicker.	3.21c
Cleve., ⅜-in.	3.20c
Detroit	3.30c
Det., ⅜-in.....	3.10c
Houston	3.00c
Los Angeles..	3.40c
New Orleans	3.50c
New York(d)	3.30c
Philadelphia*	2.75c
Phila. floor....	4.35c
Pittsburgh	3.05c
Portland	3.40c
San Fran.	3.50c
Seattle	3.40c
St. Louis	3.34c
St. Paul	3.25c
Tulsa	3.50c

NO. 10 BLUE	□
Baltimore* ..	2.95c
Boston††	2.90c
Buffalo	3.10c
Chattanooga..	3.26c
Chicago	2.95c
Cincinnati	3.10c
Cleveland	3.01c
Det., 8-10 ga.	3.03½c
Houston	3.35c
Los Angeles..	3.65c
New Orleans	3.50c
New York	3.17c
Portland	3.65c
Philadelphia*	2.95c
Pittsburgh	2.85c
San Fran.	3.75c
Seattle	3.65c
St. Louis 3.19c-3.36c	
St. Paul	3.45c
Tulsa	3.70c

NO. 24 BLACK	□
Baltimore*†..	3.50c
Boston (g) ..	3.75c
Buffalo	3.25c
Chattanooga..	4.01c
Chicago	3.70c
Cincinnati	3.85c
Cleveland	3.76c
Detroit	3.78½c
Los Angeles..	4.15c
New York	3.65c
Philadelphia*†	3.40c
Pittsburgh**..	3.40c
Portland	4.25c
San Fran.	4.25c
Seattle	4.25c
St. Louis	3.94c
St. Paul	3.695c
Tulsa	4.75c

NO. 24 GAL. SHEETS	□
Baltimore*†..	3.75c
Buffalo	4.00c
Boston (g) ..	4.35c
Chattanooga..	4.61c
Chicago 4.20c-4.30c	
Cincinnati	4.45c
Cleveland	4.36c
Detroit	4.45c
Houston	4.40c
Los Angeles..	4.75c
New Orleans	4.35c
New York	4.25c
Pitts.** 3.90c-4.20c	
Portland	4.85c
San Fran.	4.85c
Seattle	4.85c
St. Louis	4.54c
St. Paul	4.19c
Tulsa	5.10c
Phila.*†	4.00c

BANDS	□
Baltimore	3.05c
Boston††	3.15c
Buffalo	3.30c
Chattanooga..	3.51c
Chicago	3.20c
Cincinnati	3.35c
Cleveland	3.26c
Detroit, ⅜-in. and lighter	3.28½c
Houston	3.25c
Los Angeles..	3.80c
New Orleans	3.20c
New York(d)	3.42c
Philadelphia..	3.05c
Pittsburgh	3.10c
Portland	3.90c
San Fran.	3.15c
Seattle	3.90c
St. Paul	3.20c
Tulsa	3.45c
St. Louis	3.44c

HOOPS	□
Baltimore	2.80c
Boston	4.15c
Buffalo	3.55c
Chicago	3.20c
Cincinnati	3.35c
Det., No. 14 and lighter	3.28½c
New York	3.42c
Philadelphia..	3.30c
Pittsburgh	3.60c
Seattle	5.40c
St. Paul	3.75c

COLD FIN. STEEL	□
Baltimore (c)	3.71c
Boston 4.00c-4.50c	
Buffalo (h)....	3.55c
Chattanooga*	4.06c
Chicago (h)..	3.50c
Cincinnati	3.70c
Cleveland (h)	3.50c
Detroit	3.63½c
Los Ang.(f)..	5.95c
New Orleans	4.25c
New York...3.92c-4.42c	
Philadelphia..	3.73c
Pittsburgh(h)	3.45c
Portland (f)..	4.75c
San Fran. (f)	5.95c
Seattle (f)....	4.75c
St. Paul	3.20c
St. Louis.....	3.74c
Tulsa	4.65c

COLD ROLL. STRIP	□
Boston, 0.100-in., 500 lb. lots	5.20c
Buffalo	5.25c
Chicago (b)..	5.65c
Cincinnati	5.80c
Cleveland (b)	5.55c
Detroit	5.40c
Philadelphia..	4.00c
New York.....	4.55c
St. Louis	5.74c

(b) Net base, straightening, cutting, boxing, 1 ton or more.

(c) Plus mill, size and quantity extras.

(d) Minus quant. diff. up 50 cents; 400 to 9999 pounds, base; 10,000 to 19,999 pounds,

(e) New mill classif.

(f) Rounds only.

(g) 50 bundles or over.

(h) Outside delivery, 10c less.

15 cents under; 20,000 to 39,999 pounds, 25

‡Domestic bars.

*Plus. quan. extras.

**Under 25 bundles.

*†50 or more bundles.

†New extras apply.

††Base 40,000 lbs., extras on less.

Prices at Detroit, Cleveland, Chicago, Pittsburgh, Cincinnati, Chattanooga, New York, Boston, St. Louis on pounds and over, 35 cents under base. cents under; 40,000

399 pounds and less, heavier lines are subject to new quantity differentials:

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, Feb. 1

Export Prices f. o. b. Ship at Port of Dispatch—By Cable (or Radio)

PIG IRON	British gross tons U. K. ports £ s d		Continental Channel or North Sea ports, metric tons Gold parity, $4.8665 £ s d	£ s d
Foundry, 2.50-3.00 Silicon.	$14.60	2 18 6	$8.88	1 16 6
Basic bessemer.....	13.47	2 14 0*	7.30	1 10 0
Hematite, Phos. .05-.05....	14.97	3 0 0	....	.....
SEMIFINISHED STEEL				
Billets.....	$27.45	5 10 0	$11.44	2 7 0
Wire rods, No. 5 gage.....	38.92	7 16 0	21.90	4 10 0
FINISHED STEEL				
Standard rails.....	$38.67	7 15 0	$26.77	5 10 0
Merchant bars.....	1.56c	7 0 0	.72c	3 5 0
Structural shapes.....	1.64c	7 7 6	.63c	2 17 6
Plates, †¼ in. or 5 mm.....	1.78c	8 0 0	.91c	4 2 6
Sheets, black, 24 gage or 0.5 mm.....	2.06c	9 5 0	1.27c	5 15 0
Sheets, gal., 24 gage, corr...	2.51c	11 5 0	1.54c	7 0 0
Bands and strips.....	1.78c	8 0 0	.85c	3 17 6
Plain wire, base.....	2.06c	9 5 0	1.18c	5 7 6
Galvanized wire, base.....	2.45c	11 0 0	1.38c to 1.40c	6 5 6 to 6 7 6
Wire nails, base.....	2.68c	12 0 0	1.27c	5 15 0
Tin plate, box 108 lbs.....	$ 4.12	0 16 6	....	.....

British ferromanganese $85 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d 4($3.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

	£ s d		French Francs		Belgian Francs		Reich Marks	
Fdy. pig iron, Si. 2.5.....	$15.59	3 2 6(a)	$12.80	200	$13.79	305	$24.35	63
Basic bessemer pig iron....	16.22	3 5 0(a)	*11.84	185	13.11	290	26.86	(b)69.50
Furnace coke.....	4.12	0 16 6	7.68	120	4.97	110	7.44	19.25
Billets.....	27.45	5 10 0	25.92	405	19.89	440	37.30	96.50
Standard rails.....	1.84c	8 5 0	2.03c	700	2.20c	1,100	2.31c	132
Merchant bars.....	1.70c	7 12 6	1.62c	560	1.10c	550	1.93c	110
Structural shapes.....	1.95c	8 15 0	1.60c	550	1.10c	550	1.88c	107.50
Plates, †¼-in. or 5 mm.....	1.90c	8 10 0	1.97c	680	1.40c	700	2.22c	127
Sheets, black.....	2.29c	10 5 0§	2.47c	850‡	1.55c	775‡	2.52c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.....	2.84c	12 15 0	4.21c	1,450	3.00c	1,500	6.48c	370
Plain wire.....	2.06c	9 5 0	3.28c	1,130	2.20c	1,100	3.03c	173
Bands and strips.....	2.34c	10 10 0	1.89c	650	1.40c	700	2.22c	127

*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continental usually for basic-bessemer steel. a del. Middlesbrough.

Bars

Bar Prices, Page 52

Pittsburgh—The market on alloy and forging bars is slightly more active, mainly because of automotive demand. Carbon bars show little change. In general, January was a better month than a year ago in bars, in shipments and specifications. Unchanged prices prevail at 1.70c, Pittsburgh, on carbon bars, 2.45c the alloy bar base.

Cleveland—Specifications for commercial steel and alloy steel bars have improved considerably. The leading merchant producer here also reports further gains in tonnage from miscellaneous classifications. Good orders have been booked recently from commercial forging shops, hardware specialty manufacturers and road machinery builders.

Chicago—Bar demand from miscellaneous and automotive consumers is accelerating. Sales and specifications are better diversified and activity the past week was the best so far this year. Needs of farm implement manufacturers make a favorable comparison with those of recent months and of a year ago. Soft steel bars continue 1.80c, Chicago.

Boston—Commercial steel bar buying shows irregular improvement, much of the gain being traced to the more active machinery builders and a few forging shops.

Philadelphia—With bids opening this week on 1400 tons for the Pennsylvania railroad and 560 tons up for seven vessels for the coast guard, more steel bar tonnage is active than at any time so far this year. Commercial steel bars are 1.75c, Pittsburgh, or 2.04c Philadelphia.

Plates

Plate Prices, Page 52

Pittsburgh—Plates remain based firmly on 1.70c, Pittsburgh, but on a fairly heavy volume of pending railroad business considerable delay has been encountered by producers in tabulating bids. A large share of the Pennsylvania railroad's opening Feb. 5 is in plates and material for fabrication of 7000 freight cars for the same road is now under way. Pitcairn, Pa., shops are scheduling construction of 120 freight cars for February.

In the river barge market, Dravo Contracting Co. has closed on another barge for the Seaboard Shipping Corp., New York, 195 x 40 x 13 feet, requiring 375 tons of plates.

Cleveland—Interest centers in award of 12,775 freight cars by the Van Sweringen lines, which will require around 150,000 tons of plates, shapes and bars. Twenty locomotives, also awarded, will take approximately 40 tons of plates each.

Chicago—Tank fabricators note a moderate gain in inquiries. Several oil companies have fairly large improvement programs but definite inquiries are awaited. Inquiries for brewery tanks are slightly more numerous.

Boston—Plate specifications and buying have improved. The Pittsfield, Mass., consumer recently ordered out heavier shipments while large tank work boiler and industrial demand is generally better. Water tank contracts have been placed by St. Johnsbury, Vt., and Lexington, Mass.

Philadelphia—Better miscellaneous demand is reported by some plate makers, which, combined with the 6200 tons of plates on which the Pennsylvania opens bids Feb. 5 and further navy work, is imparting a much better tone to the market. Of the 8750 tons of steel required for seven small airplane carriers for the coast guard, 5775 tons will be plates. Four will be built by the Philadelphia navy yard, two at the New York navy yard and one at the Charleston navy yard. Reading Co. is expected to enter the market shortly for plates for this months' quota of car repair work at Reading, Pa. It is estimated that as much as 25,000 tons of plates will be required eventually for cars to be repaired by the Reading and its affiliate, the Jersey Central. Plates are unchanged at 1.80c, Coatesville, Pa., or 1.88½c, Philadelphia.

Contracts Placed

375 tons, one all-welded steel tank barge for movement of bulk oil for Seaboard Shipping Corp., New York, to Dravo Contracting Co., Neville Island, Pittsburgh; 195 x 40 x 13 feet.

210 tons, tank for Colonial Beacon Oil Co., Portland, Me., to Chicago Bridge & Iron Works, Chicago.

200 tons, including bars, for Alcatraz Island prison, San Francisco, to Colonial Steel Co., Pittsburgh.

Unstated tonnage, 1,000,000-gallon water tank, Newport News, Va., to Chicago Bridge & Iron Works, Chicago.

Contracts Pending

5775 tons, plates, seven small airplane carriers, to be fabricated by the navy, bids asked; in addition there will be approximately 2450 tons of shapes and 560 tons of bars.

900 tons, two siphons Owyhee project, Oregon; Morrison-Knudsen Co., Boise, Idaho, low.

290 tons, sheets, 22-inch 14 gage pipe line for Metropolitan water districts, Los Angeles; bids opened.

200 tons, buoy bodies of various types, lighthouse bureau, Staten Island, N. Y.; bids Feb. 20.

165 tons, 400,000-gallon water tank, Mitchell, S. Dak.; federal loan approved.

100 tons or more, stern-wheel snag and channel boat for Vicksburg, Miss., engineers; Nashville Bridge Co., Nashville Bridge Co., Nashville, Tenn., low at $256,200 for 250 days; Dravo Contracting Co., Pittsburgh, second low at $266,000 in 215 days.

Unstated tonnage, two side-wheel 34-inch pipe line suction dredges for Kansas City army engineers; bids postponed from Feb. 2 to Feb. 7.

Unstated tonnage, 100,000-gallon water tank, Lodi, Medina county, Ohio; federal loan approved.

Unstated tonnage, 150,000-gallon tank, quartermaster, Aberdeen Proving Ground, Md.; bids Feb. 5.

Sheets

Sheet Prices, Page 52

Pittsburgh—A proposed advance in sheets still is rumored, but if confirmed it is likely that no announcement will be made before the middle of February. The sheet market reflects a fairly broad and steady demand, at least sufficient to maintain operations in the industry at 35 to 40 per cent. Considerable automotive tonnage has come through to producing mills at Pittsburgh.

Cleveland—Sheet mills here and in an adjacent lake district serving the Michigan automobile industry are operating above 75 per cent. The Newton Steel Co., working near capacity at its Monroe, Mich., plant, will light its Newton Falls, O., mills, idle three years, Feb. 19, mainly for automobile sheets. Another important Ohio sheet producer announces it is sold up on some grades for the first quarter. A large purchase of sheets has been made for the Fisher Body Co.'s Cleveland plant. Automobile sheet orders have expanded considerably, and now are coming from practically all builders. Barrel and refrigerator interests also are buying more extensively.

Boston—Demand for sheets is inactive, although a few stamping shops are taking in heavier shipments and a scattered improvement is noted for galvanized and blue annealed sheets. Reports of an early advance on sheets has failed to drive in much extra volume.

New York—Consumers generally are not inclined to do any anticipatory buying, feeling they will be given an opportunity to protect themselves if a price advance has been filed with the American Iron and Steel institute. General volume remains light.

Philadelphia—Autobody sheet

purchases in the past week exceeded 2000 tons, and are outstanding in a rather quiet market. Many sellers look for a price increase shortly.

Cincinnati—Sheet mills in this district have stepped up production sharply to meet demand from the automotive industry. The leading interest last week scheduled all mills above 50 per cent, and is planning to increase to near 100 per cent.

St. Louis—Inquiries have increased, but sales have not improved over recent weeks. Demand is of a miscellaneous character.

Birmingham, Ala.—Sheet mills here have not increased production so far this year, but anticipate an upward trend during February.

Railroads

Track Material Prices, Page 53

Greatest interest in the railroad sector of the market centers in awards of 12,775 freight cars and 169 passenger cars by the Van Sweringen lines, formal announcement of which is expected this week. The steel involved in these awards is estimated to be about 175,000 tons.

Of the 12,775 cars for which inquiries were made it is unofficially reported 3050 will be awarded to the Pullman Car & Mfg. Corp., Chicago, 2250 to the General American Transportation Corp., Chicago, and 2975 to the American Car & Foundry Co., New York. These awards total 8275 cars.

Nickel Plate railroad has awarded 15 locomotives to American Locomotive Co., New York, and five locomotives and 20 extra tenders to Lima Locomotive Works, Lima, O. These are all the locomotives and tenders in the program of the Van Sweringen lines, on which bids were opened Feb. 1.

Total car awards in 1933 were 2460 and in 1932 they were 1749. In 1931 railroads bought 10,694 cars, which total bids fair to be far exceeded in 1934. In 1930 the purchase of cars was more normal than in any year since and the total was 45,146.

With the opening of bids on close to 30,000 tons of steel, including wheels and axles, Feb. 5, for the Pennsylvania railroad, local steel sellers will get their first taste of substantial railroad tonnage since the Pennsylvania opened bids on approximately 159,000 tons of rails, accessories and other products a few weeks ago. This tonnage, however, represents only a portion of the 75,000 tons which will be required for the 6500 freight cars to be built in addition to the 500 on which steel contracts were placed late last year.

Lehigh & New England is delayed in its plan to distribute orders for approximately 500 freight cars. The Pennsylvania is likely to act at once on the distribution of orders for a maximum of 2000 tons of rivets and an unstated amount of nuts and bolts for its car building program, deliveries to be made over the remainder of the year. Bids on this material were opened Jan. 29.

The Reading Co. is expected to inquire at once for materials for its February quota of car repairs.

This week at the Pitcairn, Pa., shops of the Pennsylvania railroad, in the suburban Pittsburgh district, construction begins on 2333 freight cars, 120 cars to be built in February and the number increasing progressively for at least the balance of 1934.

Rail mills at Chicago are resuming rolling on release of some tonnage, which is expected to increase as the season allows more outdoor work. A number of rail tonnages for which loans have been approved have not yet been placed. Pittsburgh mills have not received sufficient releases to make rolling possible.

It is reliably understood the American Iron and Steel institute, to avoid confusion of past public openings on railroad materials, will receive mileages from carriers and compile tariff allowances on which producers can base quotations.

A date is to be set shortly for new bids on 10,500 tons of miscellaneous steel for the New York Central. Bids on car wheels for that road were opened Jan. 31 but resulting confusion over bids probably will delay distribution.

Chicago, Milwaukee, St. Paul & Pacific is reported to be inquiring for 32 locomotives and the Lehigh Valley for five.

Included in materials to be purchased by the Southern Pacific with the $12,000,000 PWA loan just approved, is 40,000 tons of rails.

Car Orders Placed

Norfolk & Western, 10 deluxe passenger and eight deluxe combination passenger and baggage cars, to Bethlehem Steel Co., Bethlehem, Pa.

Locomotives Placed

15 locomotives, Nickel Plate railroad, to American Locomotive Co., New York.

5 locomotives and 20 extra tenders, Nickel Plate railroad, to Lima Locomotive Works, Lima, O.

Locomotives Pending

Chicago, Milwaukee, St. Paul & Pacific, 32 locomotives; bids asked.

Lehigh Valley, five locomotives; bids asked.

Pipe

Pipe Prices, Page 53

Pittsburgh—Because of a slight spurt the latter part of the month, the tubular products market closed January at a pace ahead of the same month a year ago but not up to December's level. The past week has seen more railroad buying, mainly in boiler tubes for repair parts. In the Southwest, oil country goods are moving better. No change has been made in pipe discounts, except in a revision of quantity extras on boiler tubes. Formerly, up to 10,000 pounds took the largest size extra. Now, 2000 to 10,000 pounds takes the old extra, and under 2000 pounds a new and higher extra has been instituted. Change was effective Feb. 1.

Chicago—Cast iron pipe orders filter in slowly, with many municipal projects for which federal loans were approved months ago held up by delays in receiving governmental sanction of bids. Springfield, Ill., is taking bids on 812 tons of 6-inch pipe. Chicago is to place 2345 tons of 12 and 16-inch material soon.

Boston—Bids are in on 2500 tons of cast pipe and several hundred tons of fittings for Boston. Inquiry is slightly heavier and prices are firmer.

New York—Considerable cast pipe has been placed for CWA projects with eastern foundries, but substantial inquiry for other work is light. Prices are generally firm at $40, eastern foundry, for 6-inch and over.

Buffalo—Outlook for pipe sales is the best in several years in this district. CWA projects will cause large volume purchases by municipalities while privately financed enterprises in the oil and gas fields nearby are counted upon to help business materially in those areas.

Birmingham, Ala.—Pipe business is only mildly active, with most shipments going to sections where construction work is not interfered with by weather. Officials of the United States Pipe & Foundry Co., Burlington, N. J., recently inspected new shops here where super-DeLavaud casting machines have been installed.

Cast Pipe Placed

900 tons, St. Johnsbury, Vt., to United States Pipe & Foundry Co., Burlington, N. J.

200 tons, 16-inch, Shorewood, Wis., to Glamorgan Pipe & Foundry Co., Lynchburg, Va.

200 tons, 2-inch, Los Angeles, to Pacific

States Cast Iron Pipe Co., Provo, Utah.
110 tons, Attleboro, Mass., to Warren Foundry & Pipe Co., Phillipsburg, N. J.

Cast Pipe Pending

2450 tons, 6 to 16-inch, Boston; Warren Foundry & Pipe Co., Phillipsburg, N. J., low; Franklin Foundry Co. Inc., awarded 175 tons branches and curvers on this project.
812 tons, 6-inch, Springfield, Ill.
384 tons, 8 to 12-inch, class 150, Fresno, Calif.; bids opened.
375 tons, 16-inch, Norwalk, Conn.; United States Pipe & Foundry Co., Burlington, N. J., low.

Wire

Wire Prices, Page 53

Chicago—Wire demand is well maintained with additional gains noted in specifications for manufacturers' wire, accompanying further improvement in production by some consumers. Automotive needs gradually are increasing. Activity in wire products shows little change, although jobbers report a moderate gain in sales. Plain wire continues 2.25c with wire nails $2.40.

American Steel & Wire Co., has been awarded 1,580,000 feet, 5/16, seven-wire galvanized steel wire strand for the federal engineer, New Orleans, at $36,620.77, f.o.b. Chicago. All bidders quoted this price, the award being made by lot.

Pittsburgh—Practically no merchant or manufacturing demand for wire is noted and although prices continue firm, lack of tonnage is keenly felt by producers.

Cleveland—Wire shipments reflect improvement in automobile production, and some large orders have been booked. Moderate gains are noted in general manufacturing requirements.

Boston—Wire buying continues to improve, covering a broader field, including specialties, spring wire and wire for manufacturing needs. The recovery from the dip earlier in the year which followed heavy late last-quarter contract specifications has been encouraging.

Steel in Europe

Foreign Steel Prices, Page 56

London—(*By Radio*)—Reopening of iron ore mines which have been closed a long time give substantiation to the revival in the steel industry. Export inquiry is improving and all districts report maintenance of active conditions. An additional blast furnace stack at Middlesbrough has been relighted. Tonnages of hematite iron have been sold to Italy and Denmark. Sheets and Staffordshire iron are comparatively dull.

The Continent reports export trade more satisfactory. Japanese competition is reported reaching Central Europe. German domestic trade is satisfactory, but French demand is sluggish.

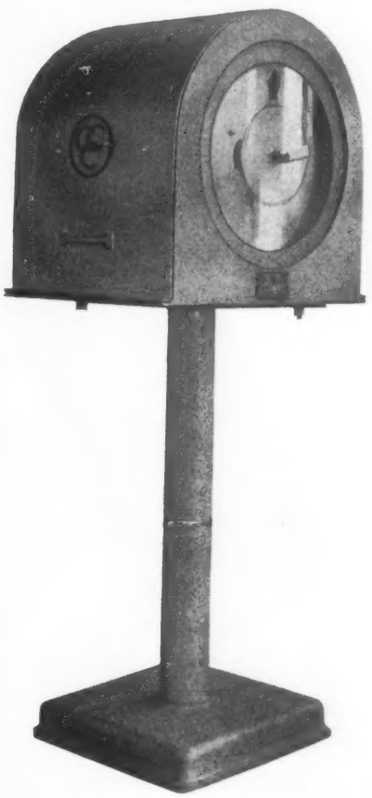
Quicksilver

New York—Quicksilver prices are steady with small lots unchanged at $68 to $69, a virgin flask of 76 pounds, and round lots $67 to $68 a flask. The market is quiet.

German exports of rails in eight months of 1933 total 45,864 tons, against 24,517 tons in the same period of 1932.

CLARK

AUTOMATIC SHEET MEASURING DEVICE



For use in any sheet or tin mill using automatic roller and catching tables and can be applied to existing installations without modification of such installations.

After the sheet passes through rolls it automatically gives an accurate indication of length of sheet by movement of pointer on an illuminated dial which may be calibrated to read directly in inches. Position of pointer is maintained while the sheet is taken back over top of rolls and until it starts through the next pass giving operator ample time to note definitely the length and set his rolls accordingly.

During next pass pointer moves from previous position to new position again indicating length of sheet after the latest pass. This operation is repeated until required length of sheet is obtained. The next piece as delivered from furnace automatically resets the pointer to indicate lengths, making it possible for the operator to know definitely the length of the sheet after each pass.

THE CLARK CONTROLLER CO.
1146 East 152nd St.
Cleveland, Ohio

Shapes

Structural Shape Prices, Page 52

Chicago—Shape awards at 8500 tons are heavier than the average of recent weeks, being made up principally of 5000 tons for two river locks and 1000 tons for a Des Moines, Iowa bridge. Inquiries total more than 7500 tons, the largest item being 3800 tons for an Illinois Central railroad bridge at Cairo, Ill. Other private projects include 500 tons for a Ford Motor Co. building at the World's fair.

Pittsburgh—Plans for the Homestead, Pa., high-level bridge, which may take a large tonnage of steel, will be surveyed shortly by PWA engineers, the project estimated to cost $2,000,000. Aronberg-Fried Co., New York, is expected to buy 1100 tons for the postoffice ramps at Pittsburgh soon. Plain structural shapes hold at 1.70c, Pittsburgh.

Cleveland — Small projects are more numerous, awards in the week including two industrial buildings, one for the Fisher Body Co., and the other for the Winton Engine Works, Cleveland. The state highway commission, Columbus, O., opens bids Feb. 9 and 10 on several bridges requiring around 200 tons.

Boston—While structural lettings are light, a fair volume of work is maturing in New England.

Philadelphia—With resumption of work on the Pennsylvania railroad electrification program releases are expected this week on tonnage held up on old contracts. Approximately 40,000 tons, it is estimated, remains unspecified. Radio towers for the bureau of yards and docks for erection in the Philippines and in Hawaii will take close to 2000 tons. Approximately 2540 shapes are required for seven vessels for the coast guard, four of which are to be built by the Philadelphia navy yard, two by the New York navy yard and one by the Charleston yard.

New York—Bids on the Manhattan-Midtown postoffice, requiring 12,000 tons, again were rejected last week, and new bids will be taken Feb. 21. Inquiry is light, including about 2000 tons of a state hospital.

Contracts Placed

3900 tons, piling, lock No. 26, Alton, Ill., to Inland Steel Co., Chicago.

1540 tons, approaches for high-speed subway, Philadelphia-Camden, N. J., to McClintic-Marshall Corp., Bethlehem, Pa.

1500 tons, causeway, Mare Island, Calif., to Columbia Steel Co., San Francisco.

1200 tons, lock No. 10, Guttenberg, Iowa, to McClintic-Marshall Corp., Bethlehem, Pa.; Hanlin & Oakes, St. Paul, general contractor.

1000 tons, bridge, Des Moines, Iowa, to Wisconsin Bridge Co., Milwaukee.

850 tons, overhead crossing, Pennsylvania railroad, East Aurora, N. Y., to Wisconsin Bridge Co., Milwaukee.

750 tons, seaplane hangar, Coco Sola, C. Z., to H. B. Nelson Construction Co., Atlanta, Ga.

625 tons, highway bridges, Oklahoma; 259 tons to Muskogee Iron Works, Muskogee, Okla.; 225 tons to Pittsburgh-Des Moines Steel Co., Pittsburgh, and 150 tons, Illinois Steel Bridge Co., Jacksonville, Ill.

450 tons, bridge, Cloud county, Kansas, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

410 tons, factory, Cincinnati, for Andrew Jergens Co., to Pittsburgh Bridge & Iron Co., Rochester, Pa.

320 tons, highway bridge, Branford, Fla., to Nashville Bridge Co., Nashville, Tenn.

310 tons, highway bridge, Wilcox, Fla., to Vincennes Bridge Co., Vincennes, Ind.

300 tons, Milk river bridge, Montana, to American Bridge Co., Pittsburgh.

230 tons, bridge for Erie railroad, Horseheads, N. Y., to McClintic-Marhsall Corp., Bethlehem, Pa.

180 tons, building for Winton Engine Works, Cleveland, to The Austin Co., Cleveland.

180 tons, factory, Baltimore, for American Zirconium Co., to Maryland Steel Products Co., Baltimore.

150 tons, platform shelters for Pennsylvania railroad, at Atlantic City, N. J., to American Bridge Co., Pittsburgh.

150 tons, store building, Kansas City, Mo., to Kansas City Structural Steel Co., Kansas City, Mo.

140 tons, women's dormitory, A. & M. College, Stillwater, Okla., to Capitol Steel & Iron Co., Oklahoma City; C. M. Dunning Construction Co., Oklahoma City, general contractor.

135 tons, state crossing at Beta, Logan county, Colorado, to unnamed interest.

134 tons, state bridge, Canooche river, Evans-Bryan counties, Georgia, to Austin Bros. Bridge Co., Atlanta; W. F. Scott, Thomasville, Ga., general contractor. Dudley Bar Co., Birmingham, Ala., awarded 56 tons of reinforcing bars.

130 tons, Pennsylvania railroad inter-

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Shape Awards Compared

	Tons
Week ended Feb. 3	15,024
Week ended Jan. 27	15,990
Week ended Jan. 20	10,720
This week in 1933	30,846
Weekly average for 1933	15,413
Weekly average 1934	16,989
Weekly average January	17,481
Total to date 1933	63,421
Total to date 1934	84,947

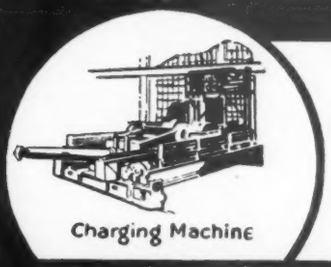
locking tower, Harrison, N. J., to McClintic-Marshall Corp., Bethlehem, Pa.
125 tons, school, Galesburg, Ill., to Davenport Machine & Foundry Co., Davenport, Iowa.
115 tons, city hall and fire station, Ellsworth, Mo., to Lyons Iron Works, Manchester, Me.
100 tons, store, Minot, N. Dak., to Fargo Foundry Co., Fargo, N. Dak.
100 tons, bridge, Aguilar, Colo., to E. Burkhardt & Sons Steel & Iron Co., Denver.
Unstated tonnage, shapes and bars, state highway underpasses, Benton-Washington counties, Arkansas, to Fort Smith Structural Steel Co., and Capitol Steel Co.; Consolidated Construction Co., Tulsa, Okla., general contractor.

Contracts Pending

8000 tons, approximately, yard poles, Pennsylvania railroad, distribution expected shortly.
5000 tons, state bridge, Choptank river, Cambridge, Md., noted in a previous issue as pending, will be up for bids Feb. 6.
3950 tons, bridge, Omaha, Nebr.; bids March 5.
3800 tons, bridge, Cairo, Ill., for Illinois Central railroad.
3200 tons, sheet steel piling, bulkhead, Government island, Oakland, Calif.; bids rejected.
2000 tons, estimated, for radio towers for the bureau of yards and docks, Washington, for the Philippines and Hawaii.
1855 tons, bridge, Fort Peck dam, Missouri river, federal engineer, Kansas City, Mo.; Massman Construction Co., Kansas City, low. Work also includes 48,440 lineal feet of steel sheet piling.
1426 tons, Park avenue bridge, Oakland, Calif.; general contract to McDonald & Kahn, San Francisco.
1100 tons, Pittsburgh postoffice ramps; Aronberg-Fried Co., New York, low on general contract.
520 tons, stables and gun sheds, Fort Bragg, N. C.; T. F. Loving Co., Goldsboro, N. C., low on general contract.
500 tons, building, Ford Motor Co., World's fair, Chicago.
450 tons, Wolf river bridge, Memphis, Tenn.
370 tons, five small bridges, Georgia.
363 tons, shapes and bars, Arkansas, and Onion Creek bridges, Bee and Travis counties, Texas; Grant Montgomery, Edinburg, Tex., general contractor.
350 tons, bridge, Amityville, Long Island, for Long Island railroad.
330 tons, two bridges, Cook county, Illinois.
250 tons, signal corps laboratory building, Ft. Monmouth, N. J.
250 tons, highway bridges, Oklahoma.
240 tons, airport addition, Middletown, Pa.
225 tons, highway bridges, Iowa.
215 tons, widening viaduct, route 23, section 11, across Boonton road and D. L. & W. railroad, Mountain View, Passaic county, New York; bids Feb. 19. Work also takes 86 tons of reinforcing bars.
200 tons, state bridges and miscellaneous work; bids Feb. 9 and 10 to highway commission, Columbus, O.
200 tons, also 100 tons of reinforcing bars and 45 tons of machinery for bridge over Swinomish slough, Skagit county, Washington; bids at Mt. Vernon, Wash., Feb. 16.
200 tons, Old Heidelberg restaurant, Chicago.
150 tons, galleries and supports, crushing and screening plant, Tennessee Valley Authority, Norris Dam, Tenn.; bids Feb. 6.
150 tons, highway bridge, Great Neck, Long Island, for Long Island railroad.
120 tons, junior high school, Shippensburg, Pa.; bids opened.
100 tons, warehouse, for Chesapeake & Ohio railroad at Huntington, W. Va.; bids Feb. 5.
100 tons, structural material, bids in Jan. 30 to United States engineer, Chicago.
100 tons, shapes and bars, Memorial Hall of Records, Annapolis, Md., and disinfecting building, Curtis Bay, Md.; Consolidated Engineering Co., Baltimore, general contractor for former.

Linderme Tube Co., Cleveland, has bought a controlled atmosphere continuous furnace for bright annealing of brass and copper products, from Surface Combustion Corp., Toledo, O.

Steel Mill Equipment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Reinforcing

Reinforcing Bar Prices, Page 53

Pittsburgh—New billet steel bars remain firm at 1.90c to ulimate consumer. The market appears slightly broader with inquiry led by 1700 tons for the Choptank river bridge, Maryland, bids closing Feb. 6. Aronberg-Fried Co., New York, is expected to buy 500 tons of rail steel bars for the Pittsburgh postoffice ramps.

Cleveland—Awards are light, comparatively few jobs being figured. Outstanding in the market are 200 tons for state road work on which bids are being taken by the highway commission, Columbus, O., Feb. 9 and 10.

Chicago—A fairly large tonnage of concrete bars is pending and general activity remains good despite the preponderance of public projects in inquiries. River locks, bridges and Chicago sanitary district construction comprise a large share of prospective work.

New York—New Jersey is closing bids this week on close to 600 tons for highways. Awards also are slightly heavier for New York state highways and bridges.

Boston—Highways and bridges account for the bulk of demand, with a slight gain in small-lot business.

Philadelphia—Award of 420 tons for the Philadelphia approach to the high-speed line over the Delaware river bridge here features a quiet market. Billet steel bars, in cut lengths, are unchanged at 2.19c, delivered Philadelphia.

Contracts Placed

420 tons, Philadelphia approach to speedway over Delaware river bridge, Philadelphia, awarded through Builders Inc., that city, general contractor, to Kalman Steel Corp., Bethlehem, Pa.; also 80 tons of sheet piling.

425 tons, seawall, Ellis Island, N. Y., to Joseph T. Ryerson & Sons Inc., New York; through A. M. Hazell, contractor.

415 tons, Owyhee dam, Oregon, project, to Pacific Coast Steel Corp., Seattle.

205 tons, women's dormitory, A. & M. College, Stillwater, Okla., to Capitol Steel & Iron Co., Oklahoma City; C. M. Dunning Construction Co., Oklahoma City, general contractor.

215 tons, Boulder dam, Colo., proposal 23046-A, down stream outlet work and proposal 23049-A, penstock tunnel, to Inland Steel Co., Chicago.

200 tons, Verdugo wash conduit, Los Angeles county, California, to unnamed interest.

132 tons, state highway work in six counties in California, to unnamed interests.

115 tons, highway, Essex county, New York, to Wheeling Steel Corp., Wheeling, W. Va.; through Louis Mayersohn, Albany, N. Y.

100 tons, highway work, New Jersey; various contracts, largest placed by Parker & Graham with Kalman Steel Corp., Bethlehem, Pa.

100 tons, ammunition depot, Lake Denmark, N. J., to Concrete Steel Co., New York; through Temple Construction Co.

100 tons, Albers Bros. grain warehouse, Seattle, to Pacific Coast Steel Corp., Seattle.

100 tons, improvement work for Pennsylvania & Reading Seaboard line, Atlantic City, N. J., to Kalman Steel Corp., Bethlehem, Pa.

Contracts Pending

1700 tons, new billet steel bars, Choptank river bridge, Cambridge, Md.; bids Feb. 6.

1143 tons, Nogales flood control project, El Paso, Tex.; bids opened.

950 tons, including 100 tons of mesh, tunnel shaft, Manhattan-Weehawken, N. J.; bids Feb. 14.

620 tons, bridge, Omaha, Nebr.; bids March 5.

560 tons, Park street bridge, Oakland, Calif.; McDonald & Kahn, San Francisco, general contractors.

500 tons, rail steel bars, postoffice ramps, Pittsburgh; Aronberg-Fried Co., New York, low.

400 tons, Campostella bridge, Norfolk, Va.; early action on this and 200 tons of sheet piling expected. The shapes, approximately 850 tons, have been placed with Virginia Bridge & Iron Co., Roanoke, Va.

400 tons, bars, six state bridges, bids to be opened at Harrisburg, Pa., Feb. 9; as noted in the previous issue, approximately 2000 tons of shapes will be required.

400 tons, interceptor sewer for Cincinnati; apparent low bid on general contract by Torson Construction Co., Louisville, Ky.

385 tons, highway, route 23, section 13A, South Mills to Pompton Turnpike, Passaic and Morris counties, New Jersey. Bids Feb. 5 to state highway commission, Trenton, N. J. Bids on same date, Little Timber creek bridge, Camden county, taking 46 tons of structurals and 20 tons of reinforcing.

300 tons, school, Bakersfield, Calif.; bids opened.

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Concrete Awards Compared

	Tons
Week ended Feb. 3	2,227
Week ended Jan. 27	2,934
Week ended Jan. 20	3,899
This week in 1933	4,345
Weekly average for 1933	3,771
Weekly average, 1934	4,335
Weekly average, January	4,862
Total to date 1933	21,738
Total to date 1934	21,676

Pig Iron

Pig Iron Prices, Page 54

Pittsburgh—Neither inquiries nor shipments in the merchant iron market seem to be any heavier. Recent buying has included a few hundred tons of malleable by a district car shop, a similar tonnage for a district jobbing foundry and a slightly larger lot for nonintegrated wrought iron producer here. In addition, basic iron is moving again to a nearby buyer in Ohio. Plans of a district pipe foundry to reopen appear to have been abandoned. Carnegie Steel Co. has been shipping bessemer iron produced at Braddock, Pa., into A. M. Byers Co.'s plant, recent shipments having totaled several thousand tons.

Cleveland—General improvement is noted in the merchant market, with inquiries, sales and shipments on the upgrade. Sales by a leading merchant interest here during the week totaled 5000 tons. Automotive foundries especially are more active. The Corrigan, McKinney Steel Co. here has lighted another blast furnace, now operating all of its four units, mainly in response to demand from its own steelworks and affiliated sheet mills.

Chicago — While January shipments were substantially below the December volume, new business was better than expected, and heavier deliveries over the balance of this quarter appear certain to develop in view of further gains in foundry operations. The upturn in the melt has been fairly general.

Boston—Buying is heavier, several domestic 1000-ton lots being sold. One large textile machinery plant is melting 65 tons daily, mainly pig iron.

New York — Some sellers report improvement, but buying as a whole still is restricted to small tonnages. Encouraging to sellers, however, is a further improvement in the melt, causing some foundries to dip more heavily into stocks. Recent buying here has included several thousand tons for shipment outside the district.

Philadelphia—Improved pig iron buying is expected, particularly as the month advances. Arrival here recently of approximately 4800 tons brings the total amount of Royal Dutch iron received since the middle of January up to about 7000 tons. It is believed that the bulk of this is against old contracts.

Cincinnati—Purchases during the past week were confined to small lots. A heavier foundry melt in this district has failed to react in the pig iron market because of inventory carryover. The Dayton Malleable Iron Co., Dayton, O., has announced opening of its Ironton, O., plant.

Buffalo — Demand is improving slowly but large tonnage inquiry and sales are lacking. January shipments fell substantially behind those of December.

St. Louis—Shipments continue in fair volume, but new business is practically at a standstill. Stove plants are slow in resuming operations, largely as a result of code uncertainties.

Birmingham, Ala. — Demand is spotty with disappointment expressed by some of the steady consumers over expected improvement in their business. Production will be increased next week.

Toronto, Ont.—New business is on the upgrade, with automotive plants furnishing a larger volume of buying. Some melters are carrying larger tonnages for current needs.

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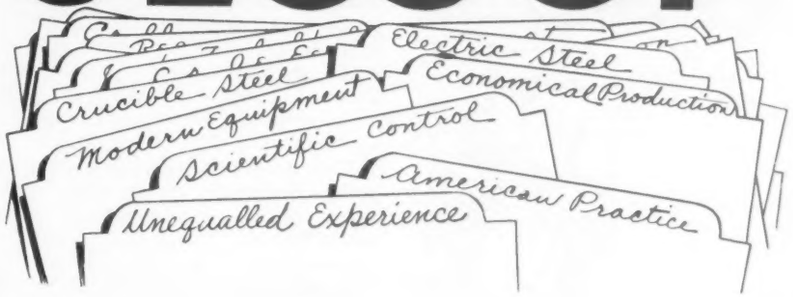

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Scrap

Scrap Prices, Page 55

Pittsburgh—Since purchase last week of 17,000 tons of No. 1 heavy melting steel by the leading interest here at $13.50, the market has taken on a strong appearance and railroad lists set for closing early this week seem destined to test December peaks. Before the mill purchase at $13.50, the market had taken on a rather weak appearance but since, inasmuch as the purchase takes all available material out of the district, scrap supplies are now scarce.

Cleveland—Scrap movement is becoming freer, consumers taking material in moderate lots. Steelmaking and foundry grades both participate. Quotations are at an unchanged level and show strength.

Chicago—Scrap is marking time, mills showing little interest in new purchases except odd lots. Prices are steady, although sales of railroad heavy melting steel continue to bring well above the top price of $11 paid on last mill transactions. Absence of new buying injects an element of weakness that is regarded as only temporary.

Boston—The Worcester, Mass., consumer of heavy melting steel is paying $9, delivered, for No. 1, is more actively taking No. 2 at $7 to $7.50, delivered, and $7 for bundled skeleton. Several grades of scrap have advanced, but buying is slightly less active.

New York—Demand for scrap has dropped with the exception of buying for barge loading, dealers paying $9, barge, for No. 1 and $7.50 for No. 2. Several cast grades are easier.

Philadelphia—While domestic buying continues quiet, there is a sufficient movement of steel scrap for export to keep the eastern Pennsylvania market firmly pegged at $11.50 to $12, delivered eastern Pennsylvania, on No. 1 heavy melting steel and up to $9.50 to $10.00 on No. 2 heavy melting steel. Eastern dealers are now offering $10.25 to $10.50, f.a.s., local port, for the prime grade of heavy melting steel and around $9, f.a.s. on No. 2 steel.

Buffalo—Dealers are holding scrap for higher prices. Leading handlers here now ask $12 for heavy melting steel and have turned down consumer offers to increase recent purchases at $11.

Detroit—Iron and steel scrap continues to mark time, dull but strong, awaiting larger supply and demand from consumers.

Cincinnati—More activity is being shown in iron and steel scrap although mills have closed no tonnage contracts recently. One mill, with an embargo on shipments for several months, bought a modest tonnage during the past week, and important consumers are showing more buying interest.

St. Louis—Purchasing of iron and steel scrap is in light volume, but dealers are bidding actively and the market continues to advance. Selected melted steel was marked up 50 cents to $10.50 to $11 per ton, the highest point since the fall of 1930.

Birmingham, Ala. — Strength marks the market for steel and iron scrap but supplies are large and will meet expected increased demand.

Toronto, Ont.—Trading in iron and steel scrap, while specialized, is running to better tonnage. Steel grades are quiet. Current demand is mostly for iron grades. Wrought scrap also is showing revival, while several other grades are becoming more active. Dealers have made no revision in prices and are out of the market for most lines.

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Warehouse

Warehouse Prices, Page 56

Pittsburgh—Warehouse steel shipments have improved the past week. The first two weeks of January were about the same as a year ago but the last half of the month made a 10 to 15 per cent improvement. Warehouse prices are unchanged except that hoops are now 3.60c for Pittsburgh delivery and 3.50c for out-of-town shipment.

Cleveland—The number of orders continues to increase, but tonnage is not improving as rapidly. A new schedule of quantity differentials is being prepared on alloy steels for early announcement.

Chicago—January sales were moderately ahead of December which was seasonally large. Sales have tended upward more rapidly during the past two weeks. Prices are unchanged.

Boston—New England warehouses have generally retained the improvement which started soon after the start of the year. Buying is well spread and prices firm.

Philadelphia—Some jobbers have taken less business in January than in December, but the loss appears small. Prices are unchanged.

Detroit—Volume of business in steel from store continues to hold at the better level established in January.

Cincinnati—Tonnage of steel from warehouse here during January was about 10 per cent better than in December, best gains being shown in the past two weeks.

St. Louis—Demand for iron and steel warehouse products is holding well, with prices steady. There has been moderate improvement in purchasing of tubular goods, particularly boiler tubes.

Strip Steel

Strip Prices, Page 53

Pittsburgh—The strip steel market is active and last week saw more orders and increased tonnage. Most buying is automotive, chiefly for hot-rolled strip although cold-rolled and some stainless grades are in demand. The market is still quoted 1.75c, Pittsburgh, on hot-rolled and 2.40c, Pittsburgh or Cleveland, base, on cold-rolled strip.

Cleveland—Strip steel orders for some leading producers in this district in January were double December bookings. The past week has witnessed further substantial improvement in automobile strip releases.

Chicago—Heavier automotive strip orders have been placed although the increase in specifications and shipments has been only fair. This is seen as temporary, arising from delays in motor car assemblies. Needs of miscellaneous strip users also are expanding steadily.

Boston—Cold strip demand has picked up materially, notably from automobile partsmakers, while miscellaneous demand is better. Cold strip is firm at 2.60c, Worcester, Mass.

New York—Indications are that strip consumers, most of whom contracted heavily last fall and have bought little since, are beginning to deplete stocks. Current orders represent actual requirements, it is believed. Hot strip is 2.08c, New York, and cold strip, 2.73c, New York.

Philadelphia—Strip buying remains spotty although talk of an impending advance stimulated interest in some quarters. Meanwhile prices are 2.04c, Philadelphia, on hot strip and 2.69c, Philadelphia, on cold.

Cold Finished

Cold Finished Prices, Page 53

Pittsburgh—The January cold-finished steel bar market was generally as poor as any month of 1933, following heavy December shipments and absence of appreciable automotive tonnage. Miscellaneous users of cold-finished steel are still fairly well stocked and give no indication of an early resumption in buying.

Tin Plate

Tin Plate Prices, Page 52

Pittsburgh—Pittsburgh district tin plate mill operations remained 35 per cent last week. A leading interest maintains a rate of around 50 per cent. With one or two exceptions there has been no can business so far this year and few contracts at the $5.25, Pittsburgh, base. Export orders are fair.

New York—While few producers expected much contracting for tin plate during the first two months this year, domestic buying so far has been disappointing.

Ferroalloys

Ferroalloy Prices, Page 54

Ferromanganese specifications are heavier, generally against contracts entered for this quarter at $85, eastern seaboard. Domestic spiegeleisen, 19 to 21 per cent, for spot shipment is steady at $26, furnace.

Bolts and Nuts

Bolt, Nut, Rivet Prices, Page 53

Quiet prevails in the bolt and nut market though every indication points to greatly increased requirements from railroads soon, as car-building programs get well under way. Some increase is noted in automotive consumption. Jobbers have reduced stocks sufficiently to require replenishment in some instances.

Bolts and nuts are 70 off list, large rivets 2.75c, Pittsburgh, and 2.85c, Chicago, and small rivets 70 and 10 off list.

Upson nut division, Republic Steel Corp., Cleveland, has been awarded 675,000 noncorrosive clips for the federal engineer at New Orleans, at $40,837.50, delivered.

Semifinished

Semifinished Prices, Page 53

Sheet bars and billets are in light demand. Forging shops are taking a slightly larger tonnage of forging billets. Prices on semifinished steel are unchanged.

Coke

Coke Prices, Page 53

Aside from demand for domestic use, the coke market features little

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activity. Standard furnace coke is $3.50, Connellsville ovens, and medium sulphur analysis $3.25. Some foundries continue to use straight furnace coke, minimum of 72 hours, instead of the foundry grade, which latter still is quoted $4.25, ovens. A more or less nominal market continues on premium grades of beehive coke although the $5 base is holding.

Foundry coke is moving more actively at Chicago, with contracting on a monthly basis and price unchanged. St. Louis users are well stocked but shipments are in good volume. Cincinnati users are taking heavier shipments and two unnamed consumers have covered 1934 requirements to a total of 115,000 tons.

Codes

(*Concluded from Page* 18)

all codes will be considered at the February meeting, and possibly eliminated.

¶A total of 243 codes has now been approved. Last week the following codes were approved, with their effective date: Alloy casting, Feb. 4; hand chain hoist, Feb. 9; fan and blower, Feb. 12.

¶Code hearings scheduled: MAPI, having 39 supplemental codes, Feb. 9; cut tack, wire tack, small staple, hog ring and ringer, Feb. 6; screw machine products, warm air furnace pipe fittings, auger, auger bit and tool, Feb. 9.

¶At the public hearing on supplemental trade practice provisions for the shovel, dragline and crane industry, the Orton Crane & Shovel Co., Chicago, charged that it had been illegally deprived of government contracts under irregular code operations and threatened a senate investigation unless its demands for revision of the code are met. The other 28 firms in the industry are unanimous for the code provisions complained against.

¶Effective Feb. 1, Henry M. Halsted Jr. became executive vice president of the Gray Iron Founders society, and with Arthur J. Tuscany as executive secretary, will have charge of the administration and organization of the gray iron jobbing foundry industry under the code which is awaiting the President's signature. Mr. Halsted resigned his position as assistant deputy administrator of the NRA, staff to assume his new position.

Equipment

Pittsburgh—For the time being, the steel mill equipment market is slow but several important mill installations are still being considered active and work is getting under way on several jobs which were reported recently. The market for repair parts has been fairly active among steel producers. Standard Steel Car Co., Butler, Pa., is making extensive improvements and the Pressed Steel Car Co. has rehabilitated some equipment in its McKees Rocks plant.

Chicago—Machinery and equipment sales and inquiries show further moderate gains. While governmental activities have been responsible for recent business in some lines, there has been a fair revival in miscellaneous industrial demand. January machine tool sales by some interests were the best in several months. Railroad purchases generally remain light. Bids are expected to be asked shortly on a large volume of equipment for the federal arsenal at Rock Island, Ill.

Boston—Demand for machinery holds well, especially with companies which during the last few years, have concentrated on new models and improved metalworking equipment. Keen interest has been shown by machinery buyers in the working exhibit of several new models by the Heald Machine Co., Worcester, Mass.

Metals

Nonferrous Metal Prices, Page 53, 55

New York—Nonferrous metals presented an irregular appearance last week. No prospects for a definite upward movement in prices are in sight as yet.

Lead—Business was spotty but prices were steady. February needs are about 60 per cent covered.

Copper—Copper declined to 8.00c, Connecticut, for delivery through May as quoted by custom smelters and the week closed with the metal in an easy position. The large mine producers named a nominal quotation of 9.00c but sales were reported as low as 8.25c. Progress on the copper code has been disrupted by disagreement on minimum prices and sales quotas.

Tin—Business was confined to a few small lots. Prices were fairly steady although tending slightly downward due to weakness in sterling exchange. World visible supplies were cut 1336 tons in January to 22,476 tons, the lowest level since 1928.

Zinc—Buying was light but prices firmed up due to an advance in Tri-State ore and threat of ore production curtailment.

Aluminum—Secondary metal moved further due to scrap scarcity and higher prices. Virgin 98-99 per cent metal held at 19.90c to 22.90c.

Antimony—Interest was lacking. Prices were somewhat easier.

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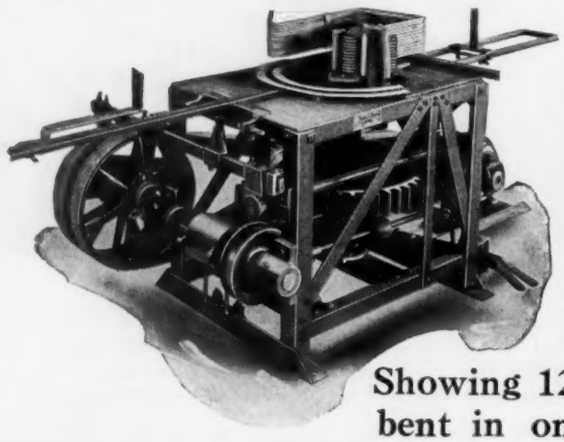

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Pacific Coast

Pacific Coast Prices, Page 53, 54, 56

San Francisco—(*By Air Mail*)—The structural steel market was the most active of the week, close to 2500 tons being placed. Federal, state and county work comprises more than 95 per cent of the total projects in sight. Due to a new earthquake law in California several hundred school buildings have been condemned and in all probability will be replaced during the coming year.

Reinforcing bar awards totaled over 1100 tons and brought the aggregate for the year to 6505 tons, compared with 2487 tons for the corresponding period a year ago. Bids have been opened on 1143 tons for the Nogales flood control project at El Paso, Tex. Bids have also been taken on 560 tons for the Park street bridge in Oakland, Calif., and on 300 tons for a school at Bakersfield, Calif. During 1934 Los Angeles will buy over 16,000 tons for reinforced concrete siphons.

Metropolitan water district, Los Angeles, has opened bids on 290 tons of sheets for a 22-inch pipe line in which 14-gage sheets will be used.

The largest structural award of the week went to the Columbia Steel Corp., San Francisco, 1500 tons for a causeway at Mare Island, Calif. H. B. Nelson Construction Co. of Georgia secured 750 tons for a seaplane hangar at Coco Sola, C. Z. Bids on 3200 tons of piling for a bulkhead at Government island, Oakland, Calif., have been rejected. McDonald & Kahn, San Francisco, secured the general contract for 1426 tons for the Park street bridge, Oakland, Calif.

James G. Dempsey, Philadelphia, is low on structural steel inspection of the federal building, San Francisco, about 4000 tons, at 19c per ton.

Public Projects Lead

Seattle — Morrison-Knudsen Co., Boise, Idaho, is low at $112,952 and $49,958 respectively for siphons for the Owyhee and Snively units of the Owyhee project in Oregon, involving 900 tons of plates. Massman Construction Co., Kansas City, Mo., bidding $985,000, is low for the 15,000-foot railroad and automobile bridge over the Missouri river at the Fort Peck, Montana, damsite. Bids are soon to be called for a 287-mile power line from Great Falls, Mont., diversion tunnels, pumps, four motor dredges and other units.

Awards include 415 tons of reinforcing for the Owyhee dam to the Pacific Coast Steel Corp., Seattle, and 100 tons of concrete bars for Albers Bros. grain warehouse, Seattle, to the same producer. American Bridge Co. is reported to have taken 300 tons of shapes for the Milk river bridge, Montana.

New business includes 200 tons of shapes, 100 tons of reinforcing and 45 tons of machinery for a bridge over Swinomish slough, Skagit, Skagit county, Washington, bids Feb. 16. Bids will soon be called at Boise, Idaho, for a $250,000 railroad undercrossing at Pocatello and a $60,000 viaduct at Hammett. Seattle has opened bids for 1164 tons of sheet steel piling and shapes for the seawall project.

Bids have been opened at Fort Lewis for three permanent buildings, steel frames and trusses, totaling $200,000. Additional figures will be received Feb. 10.

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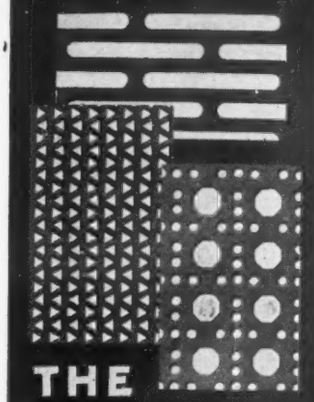

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Here and There In Industry

KING & ANDREWS, Hanna building, Cleveland has been organized by John S. King and B. J. Andrews to direct and handle sales of automotive hardware and mill supply products. Mr. King formerly was president of King, Wiley & Co. Inc., national advertising agency, and recently as sales manager of the jobbing division of the Weatherhead Co., Cleveland. National and overseas distribution will be handled for a limited number of companies whose products do not conflict. Facilities will be available for complete selling from the time a product is manufactured, including merchandising and marketing, as well as sales direction. Domestic sales force will be directed in the field by Mr. King, assisted by John T. McQuillan, formerly with Black & Decker, Towson, Md., and two field supervisors.

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Henry Disston & Sons Inc., Philadelphia, has appointed Otto Kafka, 2 Rector street, New York, export sales agent for its line of tool steels, armor plate and tractor tanks.

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Wheeling Corrugating Co., Wheeling, W. Va., has leased a warehouse building at Atlanta, Ga., and will remove its warehouse branch from Chattanooga, Tenn., about Feb. 1. About 35 people are employed.

□ □ □

Hall Mfg. Co., Toledo, O., manufacturer of production and service machinery for valve seat grinding, has sufficient business in hand to keep its plant busy two years. Its plant is operating at capacity with day and night shifts. Shipments are being made to all parts of the world, including Europe, the Orient, Africa and Australia.

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Luria Bros. & Co. Inc., dealer in iron and steel scrap, will move its headquarters from Reading, Pa., to the Lincoln-Liberty building, Broad and Chestnut streets, Philadelphia, effective about March 1. The local Philadelphia offices, in charge of W. L. Forebaugh, will be moved from the Commercial Trust building to the new address.

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Electric Generator & Motor Co., A. Friedman president, has moved to larger quarters at 4519 Hamilton avenue, Cleveland, where 50,000 square feet is available. Facilities have been increased for service to industrial plants in repair of motors, generators and other electrical equipment. Columbia Electric Mfg. Co., manufacturer of low-voltage generators, alternating-current generators and plating tank rheostats, occupies the new plant jointly.

□ □ □

National Gypsum Co., Buffalo, has bought the metal lath plant of the Kalman Steel Corp., subsidiary of Bethlehem Steel Corp., at Niles, O. The plant will be equipped with modern machinery for the production of metal lath and metal reinforcing items as a further step in the company's policy of expansion in the wall and ceiling building products field.

□ □ □

Milwaukee Stamping Co., Milwaukee, Edwin B. Bartlett president, finds its business for the last half of 1933 exceeded that of first half by 55 per cent and for all of 1933 it was 15 per cent better than for 1932 on a dollar basis. Production schedules this month are 50 per cent better than in January, 1933. A new line of bathroom fixture partitions has been developed.

□ □ □

Hays Corp., Michigan City, Ind., manufacturer of combustion instruments, has appointed several new representatives for sale of its products: T. C. Messplay, 2219 East Sixty-ninth terrace, Kansas City, Mo.; Fairman B. Lee, 114 Railroad avenue South, Seattle; Leinart Engineering Co., 427 Walnut street, Knoxville, Tenn.; Engineering Sales Co., Meyer building, Holland, Mich.

□ □ □

R. & T. Co. has been formed at Cleveland, with Milton A. Thesmacher president, A. E. Riester vice president and D. V. Burt secretary-treasurer. It has purchased the plant equipment of the former Riester & Thesmacher Co., manufacturer of sheet metal products and special equipment, at 1526 West Twenty-fifth street, Cleveland, and has leased the property, to continue operations. Bondholders of the old company have purchased the property there and also another plant Brookpark road on a tract of 11 acres. The latter will be held by the Par-Brook Holding Co. and will be operated by the R. & T. Co.

□ □ □

Bureau of Russian technical translations has been organized by a number of Russian engineers residing in St. Louis, with headquarters at 5871 DeGiverville avenue, Basil N. Osmin, secretary. Translations are handled by specialists in each line, scientific, mechanical, electrical, chemical and welding. The staff consists of: N. P. Boorzhinsky, civil and electrical engineer; A. F. Bucholtz, biologist; Eugene V. Nay, chemist; C. N. Neklutin, mechanical engineer; V. P. Netchvolodoff, consulting engineer; V. V. Netchvolodoff, mechanical and industrial engineer; Basil N. Osmin, metallurgy and welding. The bureau offers translations in French, German, Spanish and Russian.

New Trade Publications

PROFILING MACHINES—American Oxycop Co., Niagara Falls, N. Y., in a current bulletin describes and illustrates its profiling machines for use with coal gas.

CENTRIFUGAL CASTINGS—Shenango-Penn Mold Co., Dover, O., in Bulletin No. 133 describes various uses for its centrifugal castings of bronze and other alloys.

VALVES—American Car & Foundry Co., 30 Church street, New York, in circular No. 51 covers its improved lubricated plug valves, with diagrams and tables of engineering data.

PIPE THREADING—Principles of pipe threading form the text of a booklet by the National Tube Co., Pittsburgh. It is a treatise on pipe threading practice with illustrations and diagrams to reinforce the text.

ELECTRIC FURNACE—W. S. Rockwell Co., 50 Church street, New York, in bulletin No. 345 presents its belt-conveyor type electric furnace, with advantages found in its use and a table of sizes and capacities.

IRON PIPE—Republic Steel Corp., Youngstown, O., has issued a bulletin on its iron pipe, with stress on its permanence. It includes technical data and tests, methods of fabrication and welding and tables of weights and pressures. Numerous illustrations show installations.

CEMENT GUN—Cement Gun Co., Allentown, Pa., has published a 50-page booklet describing and illustrating its cement gun and numerous uses to which it may be applied. It is pointed out that the gun may be used in placing refractory materials in various types of furnaces.

BRIDGE FLOORING — Carnegie Steel Co., Pittsburgh, has issued a booklet on its T-Tri-Lok bridge floor construction, a light-weight, heavy-duty floor with integral armoring. Ample illustrations show fabrication of the material and its installation. Tables of engineering data are included.

PIVOTED MOTOR BASES—Rockwood Mfg. Co., Indianapolis, has issued five folders on current developments in its pivoted motor drive bases. Ceiling and vertical types of bases are new in the application of automatic tension control. Its drive truck also is new, developed for farm use with gas or electric motors.

BRONZE CASTINGS—Superheater Co., East Chicago, Ind., has published a booklet entitled "Elesco Bronze Castings." It discusses standard bronzes, aluminum bronzes, high tensile manganese bronze, bushings and bearings, gears, worms, worm gears, pinions, feed nuts, acid resisting castings, etc.

POLISHING GRAIN—Norton Co., Worcester, Mass., has published a booklet entitled "The Technical Aspect of Polishing Grain." The topics discussed include the functioning of polishing grain, abrasive developments, angularity or grain shape, bonding strength, controlled sizing and factors of efficient polishing.

Construction and Enterprise

New England

BURLINGTON, VT. — Burlington electric light department, J. E. Burke mayor, plans alterations and additions to its electric light plant, including two diesel engines and generators, costing over $200,000. R. E. Palmer, 7 Montgomery avenue, Holyoke, Mass., is engineer.

New York

NEW YORK—American Consolidated Tin Mines, 120 Liberty street, is having plans drawn by U. S. James, engineer, care James Ore Concentrator, 35 Runyon street, Newark, N. J., for an ore mill and development near Lincolnton, N. C., to cost about $100,000.

New Jersey

NEWARK, N. J.—Abraham Isaac Inc. has been incorporated with 1000 shares no par value to deal in iron products, by Joseph Steiner, agent, 700 Broad street, Newark, N. J.

PERTH AMBOY, N. J.—Department of public works, Dr. John V. Smith director, plans construction of two main pumping plants for the new sewage disposal works on the Raritan river, with necessary mechanical equipment for sewage treatment. Cost about $850,000. Louis P. Booz is city engineer.

Pennsylvania

CAMBRIDGE SPRINGS, PA.—White Petroleum & Refining Co., Favor White president, Cambridge Springs, Pa., will install pumping machinery and power equipment in its proposed oil refinery here at cost of about $90,000.

MORRIS, PA.—R. W. Hilton, care Pennsylvania Charcoal & Chemical Co., Smethport, Pa., has bought the idle plant of the Morris Chemical Co., here, and plans to rehabilitate it and install new equipment at cost of about $28,000.

PITTSBURGH—Westinghouse Electric & Mfg. Co., East Pittsburgh, and General Electric Co., Schenectady, N. Y., have been given part of contracts for electrical equipment for the Pennsylvania Water & Power Co., and the Safe Harbor Water Power Co., both 40 Wall street, New York. The two contracts are valued at about $1,250,000.

TITUSVILLE, PA.—Pennsylvania Refining Co. will take bids soon for additions and alterations to its refinery, including a complete distillation unit, to cost $50,000.

Ohio

CLEVELAND—Ideal Automatic Machine Co. has been incorporated with 250 shares no par value to manufacture automatic devices, by Byron D. Kuth, George E. Ehrke and associates, Guarantee Title building.

CLEVELAND—Winton Engine Co., 2160 West 106th street, will build an addition to cost $75,000 for use as a testing department. Austin Co., 16112 Euclid avenue, Cleveland, has been given contract for plans, engineering and construction.

CLEVELAND—R. & T. Co., 1526 West Twenty-fifth street, has been organized with 250 shares no par common stock and 100 shares no par preferred, by Milton A. Thesmacher, president, A. E. Riester, vice president, and D. V. Burt, secretary-treasurer, to take over the plants and business of the former Riester & Thesmacher Co. Manufacture of sheet metal products has been begun by the new organization.

FAIRFIELD, O. — Construction quartermaster, Patterson field, Fairfield, O., plans a steam power plant for central heating service. Appropriation of $200,000 will be available. A. M. Kinney Inc., Carew tower, Cincinnati, is consulting engineer.

FREMONT, O.—H. B. Reppetto, Fremont, president of the Clyde Stove Co., has bought the New Method Stove Co., Mansfield, O., and will move machinery and equipment to Fremont, O.

MANSFIELD, O.—Barnes Inc. has been organized by local capitalists and has bought the assets of the Barnes Mfg. Co., which has been in receivership. Pumps and sanitary enamel ware are manufactured.

MONTPELIER, O.—W. C. Snyder has moved his aluminum foundry from Bryan, O., to Montpelier, where he will produce aluminum, brass and bronze castings.

NEWARK, O.—American Bottle Co. will shortly reopen its plant here after idleness of four years, it is announced by W. G. Levis, president of the Owens Illinois Glass Co.

Michigan

DETROIT—Continental Die Casting Corp. has moved to larger quarters at 2950 Woodbridge street, where larger facilities are available for production of die castings.

DETROIT—S. Harcus & Sons Inc., 3942 Rusell street, Detroit, has been awarded the general contract for an addition to the federal prison at Milan, Mich.

ELSIE, MICH.—Elsie Elevator Co. is having plans made for an elevator at Elsie, Mich., to cost $15,000.

GRAND RAPIDS, MICH. — Roger Allen & Son, architects, are preparing plans for a $75,000 grade school for Ionia, Mich., and a $9000 addition to the high school at Wyoming Park, Kent county, Michigan.

LAKE ODESSA, MICH.—Lake Odessa Canning Co. is building an addition to its plant here, to cost about $18,000.

LUDINGTON, MICH.—Bates Ludington Co. has been incorporated with $63,500 capital to manufacture automotive parts, by R. E. Bates, Ludington, Mich.

MACKINAC ISLAND, MICH.—City council plans a municipal electric light and power plant to cost about $150,000 with equipment. Eugene

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Illinois Steel Co., 208 So. LaSalle St., Chicago. Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Youngstown, O.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.

BABBITT METAL
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BANDS—See HOOPS AND BANDS

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Illinois Steel Co., 208 So. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BAR BENDERS
Kardong Bros., 346 Buchanan St., Minneapolis, Minn.

BARGES (Steel)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
McClintic-Marshall Corp., Bethlehem, Pa.

BARRELS (Plating)
Udylite Process Co., 3953 Bellevue Ave., Detroit, Mich.

BARS (Alloy)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 431 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Timken Steel & Tube Co., Canton, O.

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Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Youngstown, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
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Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., Youngstown, O.

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Bantam Ball Bearing Co., The, South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
New Departure Mfg. Co., Bristol, Conn.

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Shenango-Penn Mold Co., Dover, O.
Shoop Bronze Co., 344-54 W. 6th St., Tarentum, Pa.

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Bantam Ball Bearing Co., The, South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt, Roller Bearing Co., P. O. Box 476, Newark, N. J.
Timken Roller Bearing Co., The, Canton, O.

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Bantam Ball Bearing Co., The, South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roll Neck)
Bantam Ball Bearing Co., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
Ryerson, Jos. T. & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Timken Roller Bearing Co., Canton, O.

BEARINGS (Thrust)
Bantam Ball Bearing Co., The, South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Timken Roller Bearing Co., The, Canton, O.

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Morgan Engineering Co., The, Alliance, O.
Thomas Spacing Machine Co., Pittsburgh, Pa.

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Koppers Construction Co., 1301 Koppers Bldg., Pittsburgh.
Youngstown Sheet & Tube Co., Youngstown, O.

BILLET CHIPPERS—SEE CHIPPERS (Billet)

BILLETS (Alloy and Carbon Steel)
Alan Wood Steel Co., Conshohocken, Pa.
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Illinois Steel Co., 208 S. La Salle St., Chicago, Ill.
Republic Steel Corp., Youngstown, O.
Timken Steel & Tube Co., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.

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Alan Wood Steel Co., Conshohocken, Pa.
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Norton, Co., Worcester, Mass.